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AN
ESSAY
ABOUT THE
ORIGINE & *VIRTUES*
OF
GEMS.

Wherein are Propos'd and Hiſtorically Illuſtrated ſome Conjectures about the Conſiſtence of the Matter of *Precious Stones*, and the Subjects wherein their chiefeſt Virtues reſide.

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LONDON,
Printed by *William Godbid*, and are to be ſold by *Moſes Pitt* at the *White Hart* in *Little Britain*, 1672.

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THE PUBLISHER TO THE READER.

THe Philoſophy and Origine of Gems as well as theire Uſefulneſs and Virtues will, I am perſwaded be found, upon the attentive peruſal of this *Eſſay* it ſelf, ſo rationally and warily deliver'd therein, that there will need nothing to be ſaid in the praiſe of the Compoſure thereof. I dare venture, notwithſtanding the Noble Author's modeſty, to preſent it to the moſt Critical taſte, without hanging out a Buſh to it.

All I have to ſay in the publiſhing thereof, ſhall be the ſame, that was alledged by the Engliſh Interpreter of the Learned *Steno*'s Prodromus to an intended *Diſſertation* of his, concerning Solids naturally contained within Solids, printed the laſt year by *Moſes Pitt* in *Little Britain*; where in the *Engliſh* Preface occurr paſſages to this effect, *viz.*

"That the Honourable Au-
"thor of this *Eſſay*, before he
"would ſee or hear any thing
"of that Prodromus of *Steno*,
"did upon occaſion ſolemnly
"declare

“declare to the Author of that Engliſh Verſion (who there proteſts, that he ſpeaks it *bona fide*,) the ſum and ſubſtance of what is deduced at large in this Tract; the Manuſcript whereof the ſaid Interpreter then ſaw, and received it into his cuſtody for publication: Which Sum was this; *Firſt*, that the generality of *Tranſparent* Gems have been once Liquid Subſtances, and many of them, whilſt they were either fluid, or at leaſt ſoft, have been imbued with Mineral Tinctures, that con-coagulated with them; whence he conceives, that divers of the real Qualities and Virtues of Gems may be probably derived.

" *Secondly*, as for the *Opacous* " Gems, and other Medical " Stones, as *Blood-ſtones*, *Jaſpers*, " *Magnets*, *Emery*, &c. he eſteems " them to have, for the moſt " part, been Earth (perhaps in " ſome caſes very much diluted " and ſoft) impregnated with " the more copious proportion " of fine Metalline or other Mi-" neral juices or particles; all " which were afterwards reduced " into the form of Stone by the " ſupervenience (or the exalted " action) of ſome already inex-" iſtent petreſcent Liquor or pe-" trific Spirit, which he ſuppoſeth " may ſometimes aſſcend in the " form of Steams; from whence " may be probably deduced not " only divers of the Medical Vir-

“ tues of ſuch Stones, but ſome
“ of their other qualities, as Co-
“ lour, Weight, &c. and alſo ex-
“ plained, how it may happen,
“ what he hath (which he doubts
“ not but others have done alſo)
“ obſerv'd of Stones of another
“ kind, or Marchaſites, or even
“ Vegetable and Animal ſub-
“ ſtances, that have been found
“ incloſed in ſolid Stones; for as
“ much as theſe ſubſtances may
“ eaſily be conceived to have
“ been lodged in the Earth, whilſt
“ it was but Mineral Earth or
“ Mud, and afterwards to have
“ been, as 'twere, caſed up by the
“ ſupervenient petrific Agents
“ that pervaded it.

“ Nor are theſe petreſcent
“ Liquors the only ones, to

“which he ſuppoſes that many “Foſſils may owe their Origine “ſince he thinks, there may be “both *Metalleſcent* and *Mineral-* “*leſcent* Juices in the bowels of “the Earth, and that ſometimes “they may there exiſt and ope- “rate under the ſame Spirits and “Steams.

So far the *Preface* to that Tranſlation; which is here repeated, to do right to this Noble Author, in the matter of the *Theory* relating to the Origine both of precious and other Stones. Which done, I ſhall keep the Curious Reader no longer from the Contentment, which he will doubtleſs find in the peruſal of this *Eſſay*.

THE

PREFACE.

That the Scarcity, the Luſtre and the Preciouſneſs of Gems have made them in all ages to be reckon'd among the fineſt and choiceſt of Natures Productions, is generally granted. But whether the Books, that have been divulged of them, be anſwerable to the Nobleneſs of the Subject, ſeems not to me ſo unqueſtionable: For, as for the Origine *of Gems; to ſay with* Ariſtotle *towards the cloſe of his third Book of* Meteors, *that a dry* Exhalation, ξηρᾶς ἀναθυμιάσεως, *(whether) fiery or firing,* (ἐκπυροῦσα,) *makes, among other foſſils, the ſeveral kinds of unfuſible Stones: or to tell us, according to the more received Doctrine, that Gems are made of Earth* *and Water finely incorporated & harden'd by cold; This, I ſay, is to put us off with too remote and indefinite generalities, and to found an explication upon Principles, which are partly precarious and partly inſufficient, and perhaps alſo untrue. And as to the* Hiſtory *of Gems, that has been ſo fabulouſly deliver'd, that eſpecially among the Moderns, many learned men, Philoſophers and Phyſitians, have, for the ſake of ſo many improbable and ſometimes impoſſible Virtues, that have been aſcrib'd to Gems, been induc'd to deny them any Virtues at all. 'Tis true, that I am not altogether ſo ſevere, and that the eſteem, that I find made by Learned men of the inquiſitive Emperor* Rudolfus's *Phyſitian* Boetius de Boot, *makes me diſcriminate him and two or three modern Authors, that in Books, profeſſedly made on other Subjects, have written incidentally of ſome Gems, from ſuch notoriouſly fabulous Writers as* Mizaldus, Albertus Magnus, *(if his name be not injur'd by the imputation of a ſpurious Book)* Baptiſta Porta, Kirannides *(and ſome others that I forbear to name,) from whoſe Learning one* *would expect more warineſs and Judgement. But though, for reaſons elſewhere mention'd, I do not unreſervedly think, that Pretious Stones, eſpecially Opacous ones, can have no medical Virtues at all; yet when I conſider'd, how difficult it was to aſſigne any thing that is poſſible and intelligible, (which I do not take a* ſubſtantial form *to be,) whence their Virtues may probably be derived, without giving ſome ſuch account of the Origine of Gems themſelves, as was not to be expected from the Followers of the* Peripatetic, *that is, the Received, Philoſophy; I could not but wiſh, that ſomething were attempted on that Subject according to the Principles of the* Corpuſcularian.

Theſe things made me the leſs backward to comply with the Curioſity of my Friends, which put me upon the following Diſcourſe, wherein I was content to try, what, without ranſacking the Authors that had profeſſedly written de Gemmis, *the conſideration of the Subject to be treated of, my natural propenſity to take notice of Natures productions, and the tryals whereto theſe Conſiderations and Obſervations* *lead me, would ſuggeſt to my Pen.*

Whether my Conjectures and Ratiocinations be as new to others as to thoſe I chiefly wrote for, 'tis not my part to determine: Only I deſign'd to ſuit my Diſcourſe to the Phænomena *of Nature, without being ſollicitous with whom I diſagree'd or complyed. And therefore, though it ſhould happen, that ſome Conjectures of mine ſhould, unknown to me, be coincident with the opinion of ſome Claſſic Writer about Gems; yet I preſume, the whole ſubſequent* Hypotheſis *and the Arguments 'tis founded upon, will appear to have been ſuggeſted to me by the nature of the thing it ſelf, and my way of conſidering it: not to mention, that ſometimes one may meet with a good particular Conjecture in an Author, that underſtands not the importance of it himſelf, and knows not how to make uſe of it, but builds it on ſome ſuch fabulous Relation or erroneous Principle, as is apt to diſcredit it with wary Readers, unleſs they be ſuch, to whom its complyance with the Opinions, they have on better grounds already entertain'd, happen to* *recommend it. I know, it may be thought ſtrange, that I have been ſo very ſparing in the Citation of thoſe Authors, that have writ whole Books about Gems; but I have this to ſay for my ſelf, that I had neither them, nor ſo much as my own Papers about the Origine of Minerals at hand, when I writ the following Eſſay. Which I was the leſs troubled at upon two diſtinct accounts; the firſt, becauſe I remember'd, that ſeveral paſſages, that I had met with about the Virtues of Gems, cited out of divers of thoſe Authors, were ſuch as I ſhould have much ſcrupled to vouch; ſome of them being ſuch as I knew to be falſe; others, that I ſhrewdly ſuſpected not to be true; and others, that appear'd to me altogether incredible: And the ſecond, becauſe, to forbear tranſcribing, what my Friends might probably have met with in Authors already, would beſt comlpy, both with their Deſires, which was to know my particular thoughts; and with my deſign, which was* partly *to ſee, how far I could make out thoſe thoughts by my own Arguments and Obſervations, aſſiſted only by ſome very few hiſtorical* *paſſages, that I lighted on in Writers not Claſſic; and* partly, *to take this occaſion to proſecute divers matters of Fact relating to the ſubject I was treating of, which probably would otherwiſe have been quite loſt. And I doubted not, but if this firſt draught of my Conceptions were by my Friends thought worthy of being inlarged, it would not be difficult for me, when I ſhould come at my Books and Papers again, to inrich this Tract with many Hiſtories borrow'd from famous Writers; if that ſhould be thought neceſſary by perſons, that were poſſibly leſs diffident of me than of them. In ſhort; I propos'd this Diſcourſe but as a Conjectural* Hypotheſis, *wherein I attempted to derive the Origine of Gems and one of the* main *Cauſes, (I do not ſay, the* only *Cauſe) of their Qualities and Virtues, from Principles leſs remote, and more intelligible than thoſe of the* Peripateticks; *and having deliver'd divers Obſervations and Experiments of my own about the* Phænomena *of Gems, to explicate ſome of them by intelligible Principles, and illuſtrate others by reſembling*

bling things that may be really obſerv'd in nature or eaſily perform'd by Art. Which way of handling my Subject permitted me to hope, that, whether or no I ſhould be thought a lucky Conjecturer about the Subject I attempted, I ſhould, at leaſt in ſome meaſure, prove a Benefactor to what is perhaps preferable even to lucky Conjectures themſelves, the Natural and Experimental Hiſtory of ſuch Noble Subjects as GEMS.

ERRATA.

PAge 31. *line* 3. *read* moſt of Gems, *p.* 53. *l.* 7. *r.* yet I ſhall, *p.* 108. *l.* 20. *r.* ſented Steams, *p.*146. *l.* 18. *r.* in cloſe Veſſels, *p.* 168. *l.* 18. *r.* Obſervation, to which ſome, *p.* 164. *l.*8. *r.* in Air and Water, *p.* 172. *l.* 2. *r.* of kin to Metals, *p.* 178. *l.* 8. *r.* hæmorrhagy, *p.* 179. *l.* 17. *r.* moiſtened, *p.* 180. *l.* 8: *r.* Bolus's.

AN ESSAY ABOUT The ORIGINE and VIRTUES OF GEMS.

SECT. I.

THough it will not perchance prove very difficult to propoſe to you my Conjecture about the Cauſes of the *Vertues* of *Precious Stones*; yet I fear it will not be eaſy for me to acquaint you fully with the Grounds of it. For unleſs I ſhould tranſcribe for you my whole Diſcourſe of the *Origine* of *Minerals* in General (of which you know *Stones* make a part) I cannot well lay before you all the Conſiderations, by which I have been induc'd to take up the Conjecture or *Hypotheſis* I am about to propound: and conſequently I cannot well comply with your curioſity about *Gems*, without either omitting ſeveral things which might much countenance the following Diſcourſe, or propoſing (without amply proving them,) ſome things, that I confeſs ſeem not cleer, nor ſome of them ſo much as probable, by their own Light. But ſince you will have it ſo; I will, rather than diſobey you, preſent you in one Diſcourſe ſeveral things concerning *Gems*, whereof ſome belong to others of my little Tracts about the *Origine* of *Minerals* from *Fluid* or at leaſt *Soft Bodies*; tho ſome indeed were more directly written concerning Gems: notwithſtanding that they were deliver'd not as an entire Tract about that ſubject, but as Corollaries that might be drawn from, and applications that might be made of, what had been in a more general way diſcours'd about the origination of Stones and other Minerals.

And therefore preſuming that you will ſuppoſe with me in this Diſcourſe ſome few particulars, that, I think, I have elſewhere made probable, and might perhaps do ſo from ſome of the *Phænomena* mentioned in this Writing it ſelf, I would immediately addreſs my ſelf to the ſubject of it, if I did not think a previous Admonition very requiſite.

For, I muſt at the very entrance of this Diſcourſe deſire you to take notice, that when I propoſe my Conjectures about the *Virtues* of *Gems*, I do not ſuppoſe the truth of all, or ſo much as the tenth part of thoſe wonderful properties, that Men have been pleaſed to aſcribe to them. For not only ſome of the Writers of Natural Magick, but men of note, who ſhould be more cautious and ſober, have delivered in their Writings many things concerning *Gems*, which are ſo unfit to be credited, and ſome of them perhaps ſo impoſſible to be true, that I hope the Believers of them will among the Votaries to Philoſophy be as great rarities, as *Gems* themſelves are among *Stones*. And thoſe that can admit ſuch unlikely Fables, will be as much deſpis'd by the Judicious, as Jewels can be priz'd by the Rich.

For my part, I never ſaw any great feats perform'd by thoſe hard and coſtly Stones, (as *Diamonds*, *Rubies*, *Saphires*,) that are wont to be worn in Rings. But yet becauſe Phyſitians have for ſo many Ages thought fit to receive the fragments of pretious Stones into ſome of their moſt celebrated cordial Compoſitions; becauſe alſo divers eminent Men of that profeſſion, ſome of them famous Writers, and ſome *Virtuoſi* of my own acquaintance, have by their Writings, or by word of Mouth, inform'd me of very conſiderable effects of ſome *Gems*, (eſpecially *Chriſtal*,) upon their own particular Obſervations: And laſtly, becauſe that (as I ſhall ſhew anon,) I find no impoſſibility that at leaſt ſome coſtly and leſs hard, (though indeed more valuable) Gems, may have conſiderable operations upon humane Bodies, ſome few of which I have had opportunity to be convinc'd of, I will not indiſcriminately reject all the Medicinal Virtues, that Tradition and the Writers about pretious Stones have aſcribed to thoſe Noble Minerals: Contenting my ſelf to declare in a word, that ſuſpecting moſt of them to be fabulous, my Conjectures aim only at giving one of the Cauſes of thoſe Virtues aſcrib'd to *Gems* which Experience warrants to be *real* and *true.*

Having thus explain'd in what ſenſe my Conjecture about the Virtues of pretious Stones is to be underſtood; it follows that I propoſe the Conjecture or *Hypotheſis* it ſelf; the ſubſtance of which may be compriz'd in theſe *Two* particulars: Firſt, That many of theſe Gems, and Medical Stones, either were once *fluid* Bodies, as the Tranſparent ones; or in part made up of ſuch ſubſtances as were once fluid: And ſecondly, That many of the real Virtues of ſuch Stones may be probably deriv'd from the *mixture* of *Metalline* and other Mineral ſubſtances, which (though unſuſpectedly,) are uſually incorporated with them: And the *Greatneſs* of the

Variety and Efficacy of thoſe Virtues may be attributed to ſome happy Concurrent Circumſtances of that Commixture. The *firſt* of theſe heads relates properly to the *Origine of Gems.* The *ſecond*, partly to that, and partly to the *kinds* and *degrees* of their Virtues.

But that any Gems, eſpecially the hardeſt ſorts of them, ſhould have a later Begining, then that of the Earth it ſelf, will probably be thought to reliſh of a *Paradox*; and I doubt not, it will paſs with many for a great one, that ſome of theſe hardeſt of ſolid Bodies ſhould have been once fluid ones or Liquors: Wherefore I ſhall endeavour to Countenance this *Hypothesis* by the following Conſiderations.

1. And firſt the Diaphaneity of Diamonds, Rubies, Saphires, and many other Gems agrees very well with this Conjecture, and thereby ſeems to favour it. For 'tis not ſo likely, that Bodies that were never fluid ſhould have that arrangement of their Conſtituent parts, that is requiſite to tranſparency, as thoſe that were once in a Liquid

Form, during which it was eaſie for the Beams of Light to make themſelves paſſages every way, and diſpoſe the ſolid Corpuſcles after the manner requiſite to the Conſtitution of a tranſparent Body. Therefore we ſee, that *Silver* in *Aqua Fortis*, or *Lead* in *Spirit of Vineager*, having by that ſolution had their particles reduc'd into a fluid Form, thoſe particles, though before Opacous, are ſo diſpos'd of as to make not only a Diaphanous ſolution, but, if one pleaſes, tranſparent Chriſtals. And what Chymiſts uſually try with thoſe Metals, I have had the Curioſity to try with ſeveral Stones, which I may hereafter have occaſion to name to you. But this Argument I bring rather to confirm than evince my Conjecture.

Secondly, The Origine aſſign'd to Gems may be alſo countenanc'd by the *External figuration* of divers of them. For we plainly ſee, that the Corpuſcles of Nitre, Allom, Vitriol, and even Common Salt, being ſuffer'd to coagulate in the Liquors they ſwam in before, will convene into Chriſtals of curious and determinate ſhapes. And the like I have try'd in ſeveral metalline Bodies diſſolv'd in ſeveral Menſtruums. But unleſs a Concreting ſtone, or other like Body be either ſurrounded with, or in good part contiguous to a Fluid, 'tis not eaſie to conceive how it ſhould acquire a Curious Angular and determinate ſhape. For Concreſcent Bodies, as I may ſo ſpeak, if they have not room enough in an Ambient Fluid for the moſt congruous ranging of their parts, cannot caſt themſelves into fine and Regular ſhapes, ſuch as I ſhall preſently ſhow that divers Gems ſeems to affect; but the Matter they conſiſt of muſt conform to the Figures of the Cavity that contains it, and which in this caſe has not ſo much the Nature of a Womb, as of a Mold. And ſo we ſee that Salt-Petre, and divers other Salts, if the Water, they were diſſiolv'd in, be much too far boyl'd away before they are ſuffer'd to ſhoot, will, if the Liquor fill the Glaſs, ſometimes coagulate into a Maſs, faſhion'd like the inſide of the containing Veſſel, or if a pretty quantity of

Liquor remains after the coagulation, that part of the nitrous Maſs, that was reduc'd to be concreted next the Glaſs, will have the ſhape of the Internal ſurface of it, whatever that be; but thoſe Chriſtals that are contiguous to the remaining Liquor, having a Fluid Ambient to ſhoot in, will have thoſe parts of their Bodies, that are contiguous to the Liquor, curiouſly form'd into ſuch Priſmatical ſhapes as are proper to Nitre.

To apply this now to Gems; That divers kinds of them have Geometrical and determinate ſhapes, though it be not vulgarly obſerv'd, becauſe we are wont to ſee them when they are cut, if not alſo ſet in Rings and Jewels; yet I have often had the opportunity to take notice of it, by having had the curioſity to look upon many of them rough as Nature has produc'd them, and the good fortune to take divers of them out of their Wombs. For I remember, I have taken a good number of *Indian Granats* out of a Lump of heterogeneous Matter, whoſe diſtinct Cavities like ſo many

Cells, contained ſtones, on ſome of whoſe ſurfaces you might ſee Triangles, Parallelograms, *&c.* And being once near the Rock, whence thoſe Stones are chiefly fetch'd that are commonly call'd *Briſtol-ſtones*, I remember, I rid thither and procur'd a Workman or two to dig me up a Number of them, divers of which I found to be curiouſly and determinately ſhap'd, much like ſome Chriſtals of Nitre that I have taken pleaſure to compare with them. And the like figuration I have alſo obſerv'd in divers *Corniſh Diamonds*, and in a fair and large one, which one that knew not what it was, found growing with many leſſer in *Ireland*, and preſented me. And to let you ſee, that 'tis not only in theſe ſofter Gems that this curious figuration is to be met with, I ſhall add, that I found among many Stones, I had and took to be *Rubies* (and thoſe the *Jewellers* will tell you are exceeding hard) a conſiderable number, whoſe ſhapes, though not the ſame with thoſe of the *Corniſh* and *Iriſh* Stones, were yet fine and Geometrical. And the like I have obſerved even in thoſe hardeſt of Bodies, *Diamonds* themſelves; of which remembring that in my Collection of Minerals I had a pretty large one that was rough, I perceiv'd that the Surface of it conſiſteth of ſeveral Triangular Planes, which were not exactly flat, but had as it were ſmaller Triangles within them, that for the moſt part met at a point, and did ſeem to conſtitute, as it were, a very obtuſe ſolid Angle: Incourag'd by this, I examin'd ſeveral other rough Diamonds, and found the moſt of them to have Angular and determinate ſhapes, not unlike that newly mention'd. And having thereupon conſulted an expert *Jeweller*, that was alſo a Traveller, though he could not name to me the ſhapes of the un-cut Diamonds, he had met with; yet he told me, he generally found them to be ſhap'd like that I ſhew'd him; inſomuch that ſuch a ſhape was a mark, by which he uſually judg'd a Stone to be a right Diamond, if he had not the opportunity to examine it by the hardneſs.

And this I ſhall add in favour of the Compariſon, I lately intimated betwixt the coagulation of *Petre* and that of *Gems*, that having once made an odd Menſtruum, wherein I was able to diſſolve ſome pretious ſtones, there ſhot in the liquor, Chriſtals pretty large, and ſo tranſparent and well ſhap'd, that they might well have paſs'd for Chriſtals of Nitre; and yet, if I much miſremember not, they were inſipid. And I have divers times taken notice in ſuch ſtones, as the Briſtol Diamonds, That though that part, which may be look'd upon as the upper part of the ſtone, were curiouſly ſhap'd, having ſix ſmooth ſides, which at the top were as it were cut off ſloping ſo as to make ſix triangles, that terminated like thoſe of a *Pyramid* in a *Vertex*; yet that which may be look'd upon as the root or lower part of the ſtone, was much leſs tranſparent (if not opacous) and devoid of any regular figuration; of which the reaſon ſeems to be, that this being the part whereby the ſtone adher'd to its womb, it was ſully'd by the muddineſs of it, and reduc'd to conform it ſelf to whatever ſhape the contiguous part of the Cavity chanc'd to be of; whereas the upper part of the ſtone was not only form'd of the clearer part of the Lapideſcent Juice before the wateriſh vehicle was exhal'd; but had room and opportunity to ſhoot into the curious figure belonging to its Nature. And this is much more conſpicuous, where many of theſe Chriſtals grow as it were in Cluſters out of one Mineral Cake or Lump; as I have ſeen not only in thoſe ſoft but yet tranſparent Concretions, which ſome of the later Mineraliſts (for the ancient ſeem ſcarce to have known them) call *fluores*, and particularly in a very fine mineral lump, that I had once the honour to have ſhew'd me by a great Prince, and no leſs great a Virtuoſo, to whom it was then newly preſented. For this maſs conſiſted of two flat Parallel Cakes, that ſeem'd compos'd of a dirty kind of Criſtalline ſubſtance, and out of each Cake there grew towards the other a great Number of ſtones, ſome of which by their cohæſion kept the two cakes together; and moſt of theſe ſtones, having each of them a little void ſpace about it, wherein it had room to ſhoot regularly; were Geometrically ſhap'd, and, which look'd very prettily, were colour'd like a (German) *Amethyſt*. And I have my ſelf a pretty large ſtone, taken up here in *England* by a Gentleman of my Acquaintance, which conſiſts (as it were) of four parts: The lowermoſt is a thin and broad flake of coarſe ſtone, only adorn'd here and there with very minute gliſtering particles, as if they were, (as probably they may be) of a Metalline Nature; over this is ſpread another thin white, but opacous, bed, which is ſo inclos'd between the firſt nam'd bed, and the two others, that without defacing the ſtone I cannot well examine it: The third conſiſts of a congeries of minute Criſtals exceedingly thick ſet, which therefore look whitiſh, having little or no tincture of their own; and this part no more then either of the former, is not much thicker than a Barly Corn. The fourth and uppermoſt part, which yet ſeems in great part to be the ſame Chriſtals, which as they grow higher and ſpread, acquire a deeper colour, is made up of a great Number of *Amethyſts*, ſome paler, and ſome highly tincted, which are of very differing figures, and bigneſſes, according (as one may gheſs) as they had conveniency to ſhoot; *theſe* at one end of the ſtone lying in a flat bed (as it were) and ſcarce exceeding a Barly Corn in length; whereas *thoſe* at the other end ſhoot up to a good height into figur'd Criſtals, ſome of them as big as the top of my little finger, and thoſe are the moſt deeply colour'd, being alſo of a good hardneſs, ſince I found that they would eaſily grave lines upon Glaſs.

I remember alſo, that going to viſit a famous Quarry, that was not very far from a Spring which had ſomewhat of a petreſcent faculty in it, I caus'd divers ſolid pieces of rough and opacous ſtones to be broken, out of hope I had to find in them ſome finer juice coagulated into ſome finer ſubſtances; and accordingly I found, that in divers places; the ſolid and maſſy ſtone had cavities in it, within which, all about the ſides, there grew Concretions, which by being tranſparent like Chriſtal, and very curiouſly ſhap'd, ſeem'd to have been ſome finer Lapideſcent juice, that by a kind of percolation through the ſubſtance, that groſſer ſtone was made of, had at length arriv'd at thoſe Cavities, and upon the evaporation of the ſuperfluous and aqueous parts, or by their being ſoak'd up by the neighbouring ſtone, had opportunity to ſhoot into theſe fine Chriſtals, which were ſo numerous as quite to overlay the ſides of the Cavities, as I can ſhow you in ſome large Cluſters of them that I brought from thence. And inquiring of an ancient Digger, whether he had not ſometimes met with greater quantity of them? he told me, that he had, and preſented me a great Lump or maſs made up of a Numerous Congeries of ſoft Chriſtals; (but nothing ſo colourleſs as theſe other newly mentioned) ſticking to one another, but not any of them to any part of the Rock: So that they ſeem'd to have been haſtily coagulated in ſome cleft or Cavity, as it were in a Mould, where meeting & mingling before Concretionwith ſome looſe particles of Clay, the maſs may thereby be diſcolourd.

Our Argument drawn from the figuration of tranſparent Stones may be much ſtrengthened by the coalition I have ſometimes obſerved, of two or more of ſuch Stones, and the congruity in the ſhape of ſome of them to the *figures* of thoſe parts of the others, that were contiguous to them and ſeem'd to have been form'd after them. But though this *Phenomenon* be conſiderable to the ſcope of my Diſcourſe, yet perceiving that I ſhall have occaſion to inſiſt on it hereafter, I ſhall not do it now.

Thirdly, Nor is it only the external figuration of theſe Gems, but the internal Texture that favours our Hypotheſis; ſome of them ſeeming much to imitate in their Coagulation ſeveral of thoſe ſubſtances, which I have obſerv'd to have once been fluid. That common Salt may be made up of ſmall ſaline Particles, that by a Convenient Juxta-Poſition may be aſſociated into great Lumps, divers of which are cubically ſhap'd, is an obſervation eaſie enough to be made. And that ſuch Coalitions of particles may conſtitute ſolid and conſiderably hard Bodyes, I have try'd by breaking ſome of the larger Cubes of Sal Gem, and the Lumps of the Iſle of *Mayo-Salt*, whereof the firſt is *foſſile*, the other *marine*, and both *Natural*. I have likewiſe found by Tryal, that, though Silver diſſolv'd in Aqua-fortis appears uſually to ſhoot, if it be taken notice of, into flat and exceeding thin flakes; yet 'tis very poſſible ſo to order the coagulation, that many of theſe thin Plates ſhall in their Convention have their flat ſides ſo plac'd over one another, as to make up pretty large and thick Chriſtals, whoſe very outſides will be finely ſhap'd as being ſome peculiar kind of Vitriol. Nor are theſe the onely fluid Bodies, which I have reduc'd to coagulate into Conventions, of ſuch a flaky Texture; wherefore I began to ſuſpect that divers tranſparent Minerals may have the like; and in ſome Diaphanous kinds of Talk, whoſe outſides were Mathematically figur'd, I found Encouragement to try, whether ev'n ſome Gems themſelves, notwithſtanding their hardneſs, might not have ſuch an Internal figuration. Nor was I deterr'd by conſidering, that 'tis taken for granted, that Gems are of an uniform Texture, and that there muſt be a ſtrange thinneſs in the Plates that make up tranſparent ſtones, ſince no ſuch thing has been noted by the moſt curious Eye, but men have taken it for granted, that the Texture of all Gems is Uniform, without any grain or fibres, no more than there is in Gold. But as to the thinneſs of the Plates, I remember, I have ſeveral times taken pleaſure to hold a peice of good *Muſcovia-glaſs* againſt the Light, when it was of ſuch a thinneſs, that the ſpectators, though provok'd to look with curious Eyes, could ſcarce ſee the Plate it ſelf, and would by no means be brought to think that it was poſſible to ſplit it, till I did actually do it; and ſometimes I then ſubdivided it beyond ev'n my own Expectation. But to examine this Conjecture, I took ſome ſtones that had Geometrical figures on part of their Surfaces, and which I had other grounds to think to have been once fluid ſubſtances, and having diligently ſurveyed ſome of them, which ſeem'd likelieſt to give me ſatisfaction, I manifeſtly enough perceiv'd, not only with my aſſiſted, but with my naked Eyes, divers parallel Commiſſures, which ſeem'd plainly to be made by the contiguous Edges of little thin Plates of ſtone, that appear'd to lye one over another, almoſt like the Leaves of a Book that is a little open'd.

I remember that holding a large and rough Grizolette (as Artificers call hard Gems, of a blewiſh colour, brought them from *Eaſt India*) againſt the Light and curiouſly obſerving it, I have ſometimes plainly diſcern'd a grain, as they call it, in the Stone, and was anſwered by a skilful Artiſt that uſ'd to make

Seals of them, that ſuch Stones would uſually ſplit according to the *Ductus* of their Grain. I will not urge, that in ſome other Precious Stones, that were cut and Poliſh'd, as particularly the Hyacinth, and ev'n the Saphire, by obverting them ſeveral wayes to the Light, I have been able to obſerve, as it were, Commiſſures, which were ſo fine, as not to hinder, or call in Queſtion the Intireneſs of the Stone, for the Lapidaries purpoſe. This I ſay I forbear inſiſting on, becauſe the *Phænomenon* is far leſs conſiderable than what I have ſeveral times obſerv'd in New Engliſh *Granats*, wherein, eſpecially when they are broken, the Edges and Commiſſures of the thin Plates or Flakes, whereof they conſiſted, were very eaſily diſcernable. And to try whether this obſervation would hold even in the hardeſt Stones, I had recourſe to a pretty big Diamond unwrought, which being plac'd in a Microſcope, ſhew'd me the Commiſſures of the Flakes I look'd for, whoſe Edges were not ſo exactly diſpos'd into a plain, but that ſome of them were very ſenſibly extant like little Ridges, but broad at the Top above the level of the reſt. And theſe Parallel flakes together with their Commiſſures, I could in a ſomewhat large Diamond plainly enough diſcern even with my unaſſiſted Eyes. And for further ſatisfaction, I went to a couple of Perſons, whereof the one was an Eminent Jeweller, and the other an Artificer, whoſe Trade was to cut and poliſh Diamonds, and they both aſſur'd me upon their repeated and conſtant Experience, and as a known thing in their Art, that 'twas almoſt Impoſſible, (though not to break, yet) to *ſplit* Diamonds, or cleave them ſmoothly croſs the Grain, (if I may ſo ſpeak,) but not very difficult to do it at one ſtroke with a Steeled Tool, when once they had found out from what part of the Stone, and towards what part the ſplitting Inſtrument was to be impell'd: By which 'tis evident that Diamonds themſelves have a grain, or a flaky Contexture not unlike the *fiſſility*, as the Schools call it, in Wood; which you will eaſily grant to conſiſt of aſſimilated water or Juices; which having been once fluid Bodies, were fit to have their Particles ſo rang'd or diſpos'd, as to conſtitute a Body far more eaſie to be cleft according to the *Ductus* of the Fibres (or Planes) than otherwiſe. And I remember that having, as I thought, obſerv'd in a rough Diamond, which I purpoſely examin'd, that the Flakes whoſe Edges were terminated in one plain, were far enough from being parallel to thoſe whoſe Edges compos'd another plain, (I ſpeak of Phyſical planes of the ſame Stone,) I imagin'd that if this Diamond were to be cleft, it would not be ſmoothly ſplit into two peices, becauſe the Commiſſures did probably make Angles in the Body of the Stone; and accordingly I learned of the ancienteſt of theſe Diamond Cutters, that ſometimes he met with Stones, that eluded all his skill, and would by no means be ſplit like others into two parts, but, before they were cleft quite through, would break in pieces; which was a defect in the Stone he could not certainly foreſee, but was fain to learn from the unwelcome Event.

Fourthly, It ſeems not unprobable, that the Colours of *divers* Gems (for I do not ſay of *all*) are *adventitious*, and were imparted to them, either by ſome colour'd Mineral Juice, or ſome tinging Mineral exhalation, whil'ſt the Gem or Medical Stone was either in *Solutis Principiis*, or of a Texture open enough to be penetrable by Mineral Fumes. Which Arguments conſiderableneſs makes me hold it unfit to be lightly touched in this place; though I cannot diſcourſe any thing fully of it in few words, becauſe it not only *ſuggeſts* divers obſervations and other particulars, but *requires* alſo the mention of ſome of the chief of them; which therefore I ſhall now ſubjoin.

1. And the firſt ſhall be, That many Gems, not to ſay almoſt all of them, have been obſerv'd to be depriv'd of their Colour, if having fallen, or been put into the Fire they have layn too long there: Inſomuch that I have found it affirm'd upon the Teſtimony

of the Learned and Experienced *Boetius de Boot*, that all Gems will looſe their colour in the Fire except *Bohemian* Granats. How far this may be true I have not had opportunity thoroughly to examine. But I well remember that having purpoſely expos'd divers Gems to the fire, though that were but moderate, and had a Crucible interpos'd between it and them, ſome of them ſeem'd to have their Tincture much impair'd, and others quite deſtroy'd. But I muſt be ſo free as to admoniſh you, that if theſe Tryals be not warily made, they may eaſily impoſe upon us; eſpecially if we do not conſider the nature and cauſe of Whiteneſs. For any Diaphanous Body, as far as I have yet obſerv'd, being divided into a multitude of very minute parts, and conſequently acquiring a multitude of diſtinct ſuperficies's, which do briskly reflect the Light every way outwards, will appear to have a white colour that will be more or leſs vivid as the particles are more or leſs numerous, minute, and otherwiſe fitted to ſcatter the incident Beams of Light; as you may ſee by reducing to powder fine *Venice*-Glaſs, which will be white; and ev'n red Inck, if ſo ſhaken or beaten as to be brought to a froth, conſiſting of many minute Bubbles, will ſeem to have put on a whiteneſs. So that if by too haſty an Ignition, or too haſty a cooling of the fir'd Gems, they come to be flaw'd with innumerable little Cracks, they may be thought to be made white by having their Tincture driven away, when their whiteneſs really proceeds from the multitude of thoſe little flaws which are ſingly unperceiv'd; and the rather, becauſe the Body may ſtill retain its former ſhape or ſeeming intireneſs. To illuſtrate which, I have ſometimes taken pleaſure to heat a piece of Chriſtal red hot in a Crucible and then quench it in Cold Water: For ev'n when the parts did not fly or fall aſunder, but the Body retain'd its former ſhape, the multitude of little Cracks that were by this operation produc'd in it, made it quite looſe its tranſparency and appear a White Body. In making which experiment, the multitude of produc'd flaws may be pretty well diſcover'd to the incredulous, if, as I have ſometimes done, the ignited Chryſtal be warily and dextrouſly quench'd not in Water but in a very deep ſolution of Cochaneel made with Spirit of Wine, in which operation, if it be well performed,(but not otherwiſe,) enough of the red Particles of the ſolution will get into the cracks of the Chryſtal, to give it a Pleaſing Colour.

The other tryals that I have made about the reducing of Whiteneſs or paleneſs in bodies, either tranſparent, or even Semi-Diaphanous only, belonging to an other paper, I ſhall here forbear to mention them, having already ſaid enough for my preſent purpoſe, which is not ſo much to affirm poſitively, that no Proof at all can be drawn from the operation of fire upon the Colour of Gems, as to make you cautious, what Proofs drawn from thence you admit.

About Tincture of Coral.

2. Wherefore declining to ſay any

thing more about the *firſt*, I ſhall now proceed to the *next* Circumſtance, that belongs to our Argument, (which you may think to be more Conſiderable then the former) namely that the Colours of ſeveral Gems, when they are not *deſtroy'd* by fire, will be *alter'd* thereby; which being a thing that happens to divers foſſile Pigments (of which ſome I imploy to tinge Glaſs,) and other Bodies confeſſedly Mineral, argues a Commixture of Mineral ſubſtances in thoſe Stones whoſe Colour receives ſome of the Alterations I ſpeak of; which laſt words I add, becauſe I would not impoſe upon you by concealing, that there may be a change of Colour produc'd by the fire without any alteration of the tinging parts as ſuch. For by flawing the heated Gem in very many parts, a degree of whiteneſs or paleneſs emerging thereupon may ſomewhat change the former Colour. But this Alteration being but a kind of Dilution, is not that which I here mean. For I remember I have taken *Indian* Granats, and having in a

Crucible expos'd them to the fire, I found they had exchang'd their reddiſh Colour for a Dark and Dirty one, like that of Iron that has been long kept in the Air. And having taken ſome pieces of Agáte prettily enough adorn'd with waves of differing Colours, and kept them a competent time (for they ſhould not be kept too long) in the fire, I found, as I conjectur'd, that the greateſt part of the Agate ſeem'd to be depriv'd of its Tincture, being reduc'd to a pleaſant Whiteneſs: But in ſome places where there were ſtains of a differing kind from the reſt, and where there ran little Veins, that I gheſs to be of a Metalline Nature, there, I ſay, the Colour was not deſtroy'd, but chang'd, and the Veins of Pigment thus colour'd acquir'd a deep redneſs, which they will retain, if let alone; though I was induc'd to think by ſome Tryals made on other pieces of *Indian* Agate, that even theſe Metalline Tinctures were not ſo fix'd but that a laſtinger fire would drive them away, and leave the ſtones purely white.

Such a change of Colours as I lately mention'd in the Veins of Agate, is likewiſe found in thoſe of ſome other Stones, as alſo in ſome Pebbles, amongſt divers of which, that loſt only their Tranſparency by Ignition and Extinction in Water, one or two acquir'd ſo much deeper a Colour then it had before, that I thought it remarkable.

3. Another Circumſtance that ſeems to favour our Conjecture may be this, That it has been obſerved not unfrequently, that near many of the places, where colour'd Gems are found, ſome Mines or Veins of Metals are to be met with. And I think it not unlikely, that if ſearch were skilfully made, many more Diſcoveries would be made of Veins either of Metalline Oar or ſome other Mineral, Liquid or Concreted, whence, by way of Juices or Fumes, the Gems may be preſum'd to have receiv'd Tinctures. But uſually where pretious Stones are found, Mens Induſtry and Curioſity is too much confin'd to thoſe rich Minerals, and does not make them ſolicitous to look after in-

feriour Ones. Beſides, that in *Eaſt-India*, whoſe Countreys are beſt for the moſt Gems, they are wonderfully unskillful at digging Mines; as I have gather'd from the Anſwers of ſome, who purpoſely went to viſit the Diamond Mines, as they call them. To this may be alſo referr'd, that Gems are ſeveral times found in the Metalline Veins themſelves, or very near them: As I can ſhew you divers Amethyſts that an ingenious Gentleman of my Acquaintance took himſelf out of a piece of Ground abounding with the Ores of Iron and Tin, the latter of which was there plentifully dug up. And in thoſe colder Countryes, ſuch as *Germany* and *England*, where hard Gems are more unfrequent, thoſe ſoft ones that Mineraliſts call *Fluores*, are often to be found in or near Metalline Veins, ſo finely tincted by Mineral Juices, that, were it not for their ſoftneſs, they might paſs at leaſt among moſt Men, for Emeraulds, Rubies, Saphires, *&c.* as I have been inform'd, not only by ſome Mineral Writers of good credit, but alſo by eye witneſſes, and partly by my own Obſervation.

4. The fourth Circumſtance which may be alleag'd to the ſame purpoſe with the three foregoing, is, That it ſeemes poſſible, from ſome Gems by Menſtruums to obtain Tinctures that ſeem rather Extractions, than Diſſolutions ſtrictly ſo call'd: I will not urge the Chymical Proceſſes that may be met with in ſome Authors to this Effect, becauſe ſome Circumſtances in the things and in the Writers, made me ſo far ſuſpect thoſe I could try, (and thoſe that requir'd undiſcover'd Menſtruums, as they may be true, ſo, for ought I know, they may not,) as to keep me from medling with them. But I remember, I *once* made a Menſtruum, (I ſay *once*, becauſe its preparation is ſo ſubject to caſualty, that I have often fail'd in it) which being pour'd upon well colour'd *Granats*, not only not calcin'd, but intire, was in no long time beautifi'd with a high and lovely Tincture, which was admir'd by very skilful Perſons, to whom I ſhew'd it, becauſe

the Menſtruum was not more corroſive than White-Wine; and which yet I therefore took to be a genuin Tincture, partly becauſe it was drawn in the Cold, partly becauſe the Liquor would not tinge it ſelf by ſtanding, if no Body were put in it, and partly becauſe it drew a Tincture from Antimony of a very differing colour from this we ſpeak of. Nor are Granats the only Gems, which I have made the Liquor work on, in the Cold.

5. To theſe Four Circumſtances I ſhall add this Fifth; That ſome Gems, which Jewellers affirm without ſcruple to be Rubies, Saphires, *&c.* either are colourleſs, or have other colours than thoſe that are wont to belong to them. That famous Gold-Smith, *Benvenuto Cellini*, in his little *Italian* Tract of his own Profeſſion, admoniſhes his Reader, that there are one kind of Rubies, that are Naturally white; (and not made ſo by Art) which he proves by the degrees of hardneſs peculiar to Rubies. And the ſame Author elſewhere tells us of *Berills*, *Topazes*, and *Amethyſts*, that are white. And it *Page* 10.

ſeems, by what he ſays not far from that place, that the *Italian* Jewellers did not look upon the Tinctures of Gems as any thing near ſo Eſſential to them, as they are commonly reputed, ſince they reckon *Topazes* and *Saphires*, whereof one is Blew and the other Yellow, but both extreamly hard in compariſon of other Gems than *Diamonds* (and perhaps *Rubies*,) to be of the ſame ſpecies. The Degree of hardneſs of *Rubies* and *Saphires* is oftentimes ſo equal, that I knew an expert *Engliſh* Jeweller, who for that only Reaſon (for he knew not whence the difference of *Colours* might proceed) took *Rubies* and *Saphires* to be of the ſame kind of Stone.

And that Gems, referr'd by Lapidaries to the ſame kind, may be very differingly ting'd, is a truth, whereof I have ſeen notable Inſtances in *Diamonds* themſelves; which I therefore prefer to other Inſtances, becauſe the extream hardneſs of Diamonds is ſuch as keeps Jewellers from miſtaking any other Stone for a true Diamond, if they are permitted to put them on their rapidly mov'd Wheels employ'd to cut them. Now of true Diamonds I have ſeen ſome, that were Yellowiſh, others that were more Yellow, and among the reſt, one that was ſo perfectly Yellow, that I at firſt took it for a fair Topaz, though it were a Diamond valued at near three pound weight of Gold: I have alſo ſeen Diamonds and thoſe rough, as they came directly out of the *Indies*, and were ſoon after bought by Traders in Diamonds for ſuch, which were either Blewiſh or Greeniſh. And I particularly contemplated one Stone, which, if its ſhape and other things had not convinc'd me of the contrary, was ſo Green, that I ſhould have taken it for an Emerald.

I remember I had once occaſion to buy a conſiderable number of ſmall *Rubies*, divers of which were very curiouſly ſhap'd, and coming to look upon the whole parcel more leaſurely than my haſt would permit me when I bought it, I found in a great number of other Stones one, and but one, that was devoid of any Colour; but in other reſpects was ſo like the reſt, as invited me to conclude that it would have encreas'd their number, but that it was coagulated and harden'd before the Mineral Pigment had ting'd it of the ſame Colour with the reſt. In which gueſs I was confirm'd, when, having met with a Gentleman, who had been in the chief Places of the *Eaſt Indies*, where Rubies are found, and particularly at the River of *Siam*, or *Pegu*, near which he liv'd a good while, and where he frequently ſaw Rubies taken out of the bottom of the Water; and ſometimes took them out himſelf; I learn'd of him by enquiry, that he had there ſeen ſeveral Stones, each of which was partly a Ruby and partly colourleſs: And ſometimes in the ſame Stone there would be two portions of one ſort, and the third, though lying betwixt them, of another: Which has frequently obliged the Jewellers conſiderably to leſſen the Bulk of ſuch Stones by cutting off the untincted part. And, if my memory do not much deceive me, I ſaw in a great and curious

Princes Cabinet, among other rarities, a Ring, in which was ſet a Stone of a moderate bigneſs, whereof onely one half, or thereabouts, was well tincted, the other being colourleſs. In Gems that are leſs precious, and not ſo tranſparent, eſpecially in Agats and in Opacous Gems, I could eaſily give a multitude of Inſtances of the differingly tincted parts of the ſame entire Stone. And I uſually wear in a Ring a ſmall Sardonix that was once a great Princes, wherein there are three Portions one within another, the uppermoſt, Black, the middlemoſt of a kind of Cheſnut colour, the other of a Blew, almoſt like a Turquois, each of which portions is exactly of a fine Oval figure, and each of the two uttermoſt is thoroughout of a very uniform Breadth as well as colour, and exactly parallel to the other. But 'twould not be here ſo proper as 'twill be hereafter, to multiply Inſtances of Opacous Gems: Wherefore (having mentioned only the Sardonix, becauſe 'tis not alwaies Opacous,) I ſhall add concerning Tranſparent ones, That

Jewellers reckon among Saphires not only that ſort of Azure Gems which uſually paſs for ſuch, but alſo another ſort of Stones, becauſe of their Saphirine degree of hardneſs; though for their want of Tincture they call them white (Saphires.)

6. The Sixth and laſt Circumſtance belonging to the foregoing Argument or Conſideration is this, That ſometimes one may find Gems that are partly tincted and partly not: As if the tingeing Pigment mixing with one part of the matter whereof the Stone conſiſted whilſt it was Liquid or ſoft, were not copious enough to diffuſe it ſelf to the Whole, nor to give an equally intenſe Colour to all that portion that it tinges. 'Tis true that in ſome caſes the Diffuſion may be ſtopp'd by the Petreſcent Juices coagulating firſt in another part than that with which the Tincture was mix'd. And perhaps, in ſome other Caſes, the different Colours may have belonged to differing portions of matter, coagulating upon or againſt each other, at differing times, yet ſo as to

ſeem one intire Stone, as I may have hereafter occaſion to declare. Yet ſince, which ſoever of theſe explications be admitted, it will, if it belong not to this place, at leaſt confirm our main *Hypotheſis* (of the Origine of Gems from fluid or ſoft materials:) I ſhall return to what I was ſaying about Gems, partly tincted and partly colourleſs. And having onely intimated upon the by, that in ſome hard Semidiaphanous Stones, *Europæan* and *Eaſt Indian*, I have obſerved a very unequal and irregular diffuſion of the Tincture: I ſhall add to the things, that may be gather'd in favour of the propos'd Conjecture from ſome of the things before (as alſo ſince) related, theſe two Particulars.

The one, That I have (as I think I elſewhere mentioned) ſeen in *Italy*, among Rarities, a large piece of Chriſtal about the bigneſs of my two fiſts, whereof the Pyramidal part was of a Tranſparent Green, the *Vertex* being richly ting'd like an Emerald; but the further the colour ſpred from the *Vertex*, the fainter and paler it grew; ſo that, before it came neer the Baſe, it was quite ſpent, if I may ſo ſpeak, leaving the bigger part of the Stone tranſparent, but colourleſs, like ordinary Chriſtal. And by this perhaps we may explain an Expreſſion of *Joſephus Acoſta*, where he ſayes, that *Emeralds* grow in Stones like unto Chriſtals, and that he had ſeen them in the ſame Stone faſhioned like a Vein; *And they ſeem*, adds he, *by little and little to thicken and refine.* And in the ſame place this Learned Author has a memorable obſervation, that may confirm both what I have juſt now related, and what we mentioned a little above, about *colourleſs Gems: I have ſeen*, ſayes he, *ſome that were half White and half Green; others all White, and ſome Green and very perfect.* And this is the firſt Particular I was to mention.

The *Other* is afforded me by the way I have us'd and elſewhere deſcrib'd, of giving to pieces of Rock Chriſtal paſſably good Tinctures by Mineral Fumes. And ſuppoſing the thus colour'd pieces to be as intire Stones as the beholders have generally believed them, the inſtance will be pertinent to our purpoſe in ſpite of an objection. For though the Colours thus given are not wont to pervade them very deep, and have their penetration aſſiſted by no faint degree of heat; yet 'tis to be conſider'd on the other ſide, that theſe pieces of Chryſtal had attain'd their full hardneſs, and after their colouration, are cut and poliſh'd like other Chryſtals: Whereas the Gems that our Conjecture means, are ſuppos'd to have been ting'd under ground when they were yet fluid, or at leaſt ſoft. That there are ſometimes generated in the Bowels of the Earth Mineral Exhalations capable of applying themſelves to the Stones they meet with there, I have in another Diſcourſe ſufficiently declar'd. That alſo ſome hard and ſtony ſubſtances have been actually tinged with ſuch Mineral Steams, I ſhall, in the ſubſequent part of this Diſcourſe, have occaſion to take notice. And I remember too, that even in ſo hard a Gem as a

Of Subterraneal Fires, &c.

Saphire, I have obſerv'd the efficacy of theſe Subterraneal Fumes; having divers times ſeen one of thoſe Stones, wherein a fine Seal was cut, which continu'd ſo oddly ting'd notwithſtanding what had been taken off to reduce it to an exquiſite ſhape, that having inquir'd of a skilful Perſon of my acquaintance by whom it had been Ingraven, he both aſſur'd me that he had found it of the full hardneſs of a Saphire, and confeſs'd to me, that the Mineral Fumes had ſo oddly ting'd it, that in his opinion it might, by the Looks, paſs (rather) for a *Chalcedonian*.

And now, Sir, I fear I may need your pardon for having been ſo prolix in Diſcourſing of one of the Particulars belonging to our Argument; to excuſe which, I have no other Apology to make, but that I hope what hath been deliver'd, will ſcarce ſeem impertinent, and that I might eaſily have made it more tedious, if, to decline doing ſo, I had not purpoſely made ſome omiſſions.

Having then ſaid thus much about

our *fourth* Conſideration, I proceed now to add in the *fifth* place, on the behalf of the Hypotheſis hitherto favour'd, an Argument which I preſume you will not think inconſiderable; Namely, that Solid Gems may include Heterogeneous matter in them. Several Inſtances of this ſort in opacous Stones, I elſewhere recite upon my own Obſervation; but in tranſparent ones they are very great Rarities; and therefore it will not, I preſume, be thought ſtrange, if I mention but a few.

Firſt then on this occaſion I remember, that a very ingenious and qualify'd Lady, who had accompany'd her Huſband in an Embaſſy to a great Monarch, aſſur'd me, that ſhe brought thence among ſeveral Rich Preſents and other Rarities, (ſome whereof ſhe ſhew'd me,) a piece of Chriſtal, in the midd'ſt of which there was a drop of Water, which by its motion might be very eaſily obſerv'd, eſpecially when the Chryſtal was made to change its poſture. And, if my memory deceive me not, I have in ſome pieces of Rock-Chryſtal taken notice of things that ſeem to argue, that ſomewhat or other was intercepted within the Body of the Stone.

A curious perſon, that traded much and was very skilful in *Indian*-Gems, particularly *Griſolets*, which he got from the *Indies*, and whereof he ſhew'd me the largeſt I have yet ſeen, being ask'd by me, whether he had ever found in them any Heterogeneous ſubſtance, which ſomething, I had obſerv'd, made me ſuſpect that ſome of them might harbour notwithſtanding their hardneſs; he averr'd to me, that among divers rough ones, that were brought from the *Indies*, he had with wonder ſeen one that was about the bigneſs of a Filberd, in the Solid ſubſtance whereof there was a Cavity with a certain Liquor in it; which by changing the poſture of the Stone might be made to move to and fro in the Cavity: And when the drop was ſettled, it was of the bigneſs of a round Pearl that he ſhew'd me, which wanted ſomewhat of a moderate ſize for a Neck-lace. And when he had anſwer'd the Queſtions I propos'd him to clear my Doubts, he added, that this Rarity made the Stone, which was otherwiſe of a ſmall Value, priz'd at an hundred Pound. And I have my ſelf ſeen a monſtrous Gem, if I may ſo call it, and little leſs a Rarity then the former, that an acquaintance of mine had bought, (as I afterwards learnt,) from this Relatour; whoſe Narrative about the *Griſolet*, I think the more Credible, becauſe, that having had the curioſity to break a Stone, that was brought as a Rarity from the *East-Indies*, where Gems are often harbour'd in ſuch Stones, I found in the Solid ſubſtance of it (which was ſo hard as to ſtrike fire like a Flint, and in its little flakes was at leaſt Semediaphanous) a Cavity wherein were coagulated very minute but poliſh'd and Chryſtalline Stones, which ſeem'd to have their points inwards, which argued, that there had been ſome Liquor, in which theſe gliſtering particles had ſhot, though in proceſs of time the remaining and incoagulable part of it may have been imbibed by the Ambient Matter if not have eſcap'd thorough it, by Virtue of ſome peculiar congruity of it with the Pores of the Stone. Which need not be thought impoſſible, ſince experience has aſſured us, that ſome ſolid Stones and even Gems may be (though ſlowly) penetrated or have their Texture altered by common Water. Nor are theſe the only Heterogeneous ſubſtances I found included in this Stone.

And if, as Amber is reckon'd among Gems, and is ſometimes of a greater hardneſs than one would expect, ſo I could reckon it among true Stones, 'twere eaſie for me to borrow thence a great confirmation of what I have been ſaying; and how ever it will afford me an Illuſtration of it. For, not to mention many things, of what I elſewhere recite my ſelf to have ſeen in Amber, I have now by me a fine piece of clear and Solid Amber, (preſented me by a Perſon no leſs extraordinary than it) in which is included a large intire fly, in ſhape and ſize much like a Graſs-hop-per, but variouſly and curiouſly colour'd, with his Wings diſplayed.

To theſe Obſervations I ſhall add only this, That I have had my ſelf, and ſhewn to others, one of that ſort of pale *Amethyſts*, that ſome call white Amethyſts; which had been cut to be ſet in a Ring, or turn'd into a Seal, and was like that ſort of Gems ſo hard, that I could readily cut Glaſs with it; and yet in the Body of this Stone there appear'd to be a conſiderable number of things that look'd juſt as if they had been hairs, ſome of them lying parallel, and others inclining to one another; and having contemplated them as well by Day-light as Candle-light, and in divers poſitions in reference to the Light and the Eye, ſome of them ſeem'd at times to be of a lovely reddiſh Colour, but reflecting the Light, as if they were well fill'd either with Air or Water: But for the moſt part they did, as I was ſaying, ſeem to be hairs of a Browniſh Colour, which made the Stone not a little wonder'd at even by curious and skilful Men. I leave you to judge, Whether 'twill be fit here to add, that I have ſometimes ſuſpected, that even in *Diamonds* themſelves there may poſſibly be found intercepted, or mingled with a pure Lapideſcent ſubſtance, ſome Particles of Heterogeneous Matter. And *that* in this ſuſpition I was ſomewhat confirm'd, *as* by the odd Clouds I had obſerv'd in an extraordinary Diamond, and by ſome Hydroſtatical, and other Obſervations I made about thoſe Stones; (ſome of which I found heavier than either Chryſtal or white Marble,) *ſo* by my having purpoſely demanded of an ancient Cutter of Diamonds of great Practice and Experience; whether he obſerv'd not a ſenſible difference of weight among Diamonds of the ſame place: For to this he reply'd, that he had; eſpecially in thoſe that were cloudy or foul: Inſomuch that ſhewing me a Diamond that ſeem'd to me to be about the bigneſs of two ordinary peaſe or leſs; he affirmed that he ſometimes found in Diamonds of that bigneſs, about a Carrat (which is by common eſtimation four Grains) difference in point of weight.

Sixthly, The laſt Argument I ſhall imploy to ſhew, That the Matter of divers Gems may have once been fluid, may be taken from the Proofs you will meet with (in the following part of this Tract) of the Second Member of our **Hypotheſis.** For if it ſhall appear, that ſeveral even of the tranſparent Gems have metalline or other extraneous Mineral Bodies mingled with them, *per minima*, it will be very agreeable to reaſon to ſuppoſe, that ſuch a mixture was made, when the mingled Bodies were in a fluid form; ſince, beſide that one may well ask, how elſe the Metalline Corpuſcles came to be convey'd into ſuch compact and hard Bodies as Gems, 'tis very eaſie to conceive, if our Hypotheſis be admitted; and very hard otherwiſe to apprehend, how among Bodies that differ *toto genere*, as Metals and Stones, there ſhould be made mixtures ſo exquiſite as many of theſe appear to be, partly by the Uniform Coloration of the Gem, and partly by the Diaphaneity retain'd notwithſtanding this diſperſion of Mineral

Pigments through the whole Maſs; and in many Inſtances alſo by the Curious Figuration that we have lately been diſcourſing of.

Poſt-ſcript. To all the foregoing Circumſtances, I can now add ſomething, that I met with, ſince I thought to conclude with the Laſt of them, and that tends highly to the Confirmation of our Hypotheſis. In a Tract that makes part of a ſmall Book freſhly Publiſh'd in *French*, principally to acquaint Men with the waies of eſtimating Gems according to the Rates of Modern Jewellers, the Anonymus, but Curious Author, takes occaſion, to give us, from the Mouth, as he affirms, of the Famous late Travellers he convers'd with in divers places, (and whoſe Relations are indeed the recenteſt I have ſeen in Print) an account of the Number, and Names of the places, where Diamonds and Rubies are found in the *Indies*, adding ſome Circumſtances and Particularities about the Qualities of the Soil in thoſe places that I have not elſewhere met with. This Author then ſpeaking of the firſt of thoſe three Diamond-Mines, which he makes to be the only ones in the *Eaſt-Indies*, having told us that the Stones are there found ſome in the ground and ſome in the Rock, ſubjoyns, that thoſe that are drawn from the Rock, or the neighbouring parts, have ordinarily a good Water; but for thoſe which are drawn out of the Ground, their Water partakes of the Colour or Soil wherein they are found. So that if the Earth be clean and ſomewhat Sandy, the Diamonds will be of a good Water; but if it be fat or black, or of another colour, they will have ſome tincture of it. Nay he immediately annexes, that if there be ſome black or red Sand among the Earth, the Diamond will alſo have ſome grain of it. And elſewhere mentioning *the Second Mine* of *Diamonds*, which the Natives call Gems, he admoniſhes his Reader, that in this, as in the Mine of *Viſapour*, (which is that formerly mention'd) the Stones partake of the Quality of the Soil where they

Que's ilya quelque ſable noir ou rouge parmi la terre, le Diamant auſſi en aura quelqu' un Pag. 9.

they are found; ſo that if that be boggy or moiſt, the ſtone will incline to Blackneſs, and if it be reddiſh, 'twill have an Eye of that Colour. Elſewhere he tells us, that of late Years there were found in the Kingdom of *Golconda* ſtore of Diamonds, which were brought to the *Nababe*, or firſt Miniſter of State, who forbad the making any further ſearch after them, *Page* 18. 19. finding not one in the whole number to have a good Water, all of them being Black or Yellow. But by the way, whereas this Author affirms *Page* 37. it as a clear Truth, that as Gold is the heavieſt and moſt precious of Metals, ſo Diamonds are the hardeſt, and heavieſt of all Stones, he muſt excuſe me if I declare, that what he aſſerts agrees not with my experience, who having try'd the weight of an uncut Diamond Hydroſtatically, have taken ſuch a courſe to eſtimate its ſpecifick Gravity, as I find not to have been yet taken by any other, and which you will eaſily grant to be more exact than any other of the known wayes can be.

The Argument that hath detain'd us all this while, compriſed ſo great a variety of Matter, and may, I hope, perform ſo great a part of my task in this Diſcourſe, that, though I ſhall not much apologize for having dwelt ſo long upon it, yet I ſhould think my ſelf obliged to make ſome amends for my paſt prolixity by being ſuccinct in the remaining part of this Treatiſe, and therefore, having left off with an intimated promiſe to ſhew more fully, that divers Gems contain Metalline or other Mineral ſubſtances in them, I ſhould immediately connect thoſe Arguments to what hath been lately ſaid, but that I think it altogether requiſite, to make way for what is to follow, by firſt taking notice of a main Objection, that may be urged againſt the Doctrine we have been propoſing.

This is taken from the Figuration of ſome Gems (and eſpecially the Priſmatical one of Chriſtal) and ſeems the more fit to be urg'd againſt us, becauſe we our ſelves have, in the Second of the above-recited Arguments, given ſeveral Inſtances of it. For it ſeems ſcarce poſſible, that ſo curious a ſhape ſhould be ſo Uniformly produc'd in ſuch a multitude of Chriſtals, great and ſmall, unleſs there were ſome ſeminal and plaſtick power to faſhion the matter after ſo regular and Geometrical a manner.

But he that ſhall attentively conſider, what I elſewhere ſay concerning [f]the Figuration of Salts and of Metalline and other Magiſteries diſſolv'd by, and concoagulated with Salts, may be very much aſſiſted to diſcover the Invalidity of this Objection. But yet, becauſe I confeſs 'tis very ſpecious, if not important, I am content here to conſider it a little more particularly.

To this plauſible Objection then, I have two or three things to anſwer; Firſt, That there is no abſurdity to conceive, that if there be a Seminal and plaſtick power in Mineral Bodies, it may be harboured in Liquid Principles, as well as otherwhere. For we ſee that the Seed of Animals, which oftentimes, as in Elephants, Rhinocerots, *&c.* produces hard and ſolid Bones, Teeth, and Horns, is at firſt but a Liquid ſubſtance; and the Formative power in ſome Trees and their Fruits does convert the Alimental Juice into Woods, Shells, and other Bodies very Solid and ponderous.

But Secondly, I elſewhere ſhew, that ev'n in the Figures of Allom, Vitriol, and other Salts, that are ſo curiouſly and Geometrically ſhap'd, there is no neceſſity to fly to a diſtinct Architectonick principle; but that thoſe Bodies themſelves may receive their ſhapes from the Coalition of ſuch ſingly inviſible Corpuſcles, as by the Motion of the Fluid, wherein they did ſwim, and by divers aſſiſtant Circumſtances, are determin'd to ſtick together rather in that manner than in another. That this may be apply'd alſo to other Bodies, I ſhall need to ſhew in this place by no other Inſtance than that of the Salt, that (in this or ſome other paper) I formerly told you I made

See the Origine of Forms and Qualities *now publiſh'd by the Author.*

of common Salt, only by the help of Oyl of Sulphur or of Vitriol and Water. For *though* it be manifefeſtly a factitious Body compounded of Salt and Sulphur, and ſuch a Body that therein the Sea-Salt, whereof 'twas chiefly made, has had its own Nature deſtroy'd; *yet* by reaſon of the Figure of the reſultant Corpuſcles, and their fitneſs to convene when diſſolv'd in Water, into curiouſly ſhap'd Bodies, this factitious Salt, when I have rightly prepar'd it, did ſundry times ſhoot into long Chriſtals with points like Diamonds, that did emulate native Chriſtal as well in the regularneſs of the ſhape, as in the tranſparency of the ſubſtance. And to make it the more evident, That 'twas partly the Figure, that happen'd to reſult from the operation of the Oyl of Vitriol upon the Sea-Salt, and partly other Circumſtances, that determin'd the ſhape of the Chriſtals; I ſhall add, that uſually, when the Quality or proportion of the Oyl of Vitriol was other than it ſhould have been, or an errour was committed in ſome (important) Circumſtance or other of the Operation, the Saline Concretions, though they did not ſhoot at all like Cubes, as the Sea-Salt, which they were made of, would alone have done; yet they did not ſhoot any thing at all like Rock-Chriſtal, as did thoſe formerly mentioned; and for all this did, by reaſon of the curious Shapes of the Corpuſcles, they conſiſted of, ſhoot into Chriſtals for the moſt part finely Figur'd; though ſometimes of one ſhape and ſometimes of another. And that you may not have any ſuſpition as if the regular Figure, which Sea-Salt is naturally of, is any way neceſſary to ſuch figurations, I will add an Experiment that I deviſ'd to ſhew, That even out of a petreſcent Juice ſuch curiouſly figur'd Bodies may be made. I took then ſome Stony *Striæ*, elſewhere mention'd to have been found in Caves or Grottoes where petreſcent Liquors coagulated before they have time to fall down, and having diſſolv'd them in Spirit of Verdigreaſe, I put the clear Solution to evaporate in a Digeſtive Furnace after the ordinary manner; by which means, though I made the Experiment more than once, I had rather a coagulated Maſs than any thing like Chriſtals. Whereby you may learn the truth of what I was ſaying, That a Concourſe of divers circumſtances may be requiſite to determine the figuration of conſiſtent Bodies, made out of fluid ones: ſince here, for want of time for making occurſions enough for the Particles to concrete in after the moſt convenient manner, the Experiment ſucceeded not: Wherefore it being agreeable to my notions, that ſome ſorts of Bodies may require a longer time to make ſuch a Convention in, than others, I allow'd many daies to another ſolution of *Stiriæ* made in the ſame Menſtruum; after which there ſhot, as I deſir'd, about the ſides and bottom of the Glaſs a number of diſtinct Chriſtals, long, tranſparent, and curiouſly ſhap'd, moſt of which, I think, I can yet ſhew you.

Perhaps 'twill be ſaid, that the petreſcent Juice, when broken, does oftentimes appear to abound, within, with *ſtiriæ* or narrow ſtreaks like thoſe of Antimony, and that I my ſelf obſerve ſome Gems to be made up of thin flakes or plates; which internal figuration ſeems to be much more difficult to be accounted for without a Plaſtick Form, than the External.

I will not reply to this, that, for ought I know, divers known Salts would, when broken, appear to be Geometrically figur'd ev'n in the leſſer Corpuſcles as well as they are evidently ſo in their entire bulk, if we had eyes quick enough to diſcern the Shapes of the minuter as well as of the bigger Bodies. And we have great Inducements to think, that whether or no *Carteſius* do rightly make the inviſible particles, of which the ſmalleſt viſible Grains of Sea-Salt are made up, to be long and rigid like ſticks; the minute viſible concretions, of which the bigger Grains of Salt conſiſt, are as well as themſelves of a Cubical figure; I will not, I ſay, inſiſt on this reply, but proceed to alledge, That there are divers Bodies ſo luckily ſhap'd, that upon a ſlow Coalition, they will convene into a multitude of manifeſt Concretions; ſome of which will conſiſt of ſtreaks, and others be made up of Flakes; as in the Sal-armoniack, commonly ſold in the Shops (for I ſpeak not of the native, that is ſaid to come from *Armenia*,) though it be avowedly a Factitious Body, you may often obſerve, upon breaking the bigger Maſſes, great multitudes of ſtreaks, like thoſe we may uſually obſerve in the broken *ſtiriæ* of petrifying Water. And I have more than once ſeen, and alſo made, artificial Concretions (of whoſe preparation I elſewhere ſpeak) ſome of which conſiſted of Salts alone, and others of Salts and Minerals, as Stones or Antimony, which look very like Talk, being white Bodies, made up of a multitude of very ſlender ſtreaky Particles lying long-wayes one upon another, as in that Mineral. And as I have taken out of Earth many Concretions, which as they were for the moſt part outwardly ſhap'd like *Rhombus's* or Lozenges, were compos'd of a multitude of flat and extreamly thin plates; ſo I have ſometimes taken pleaſure to imitate ſuch Concretions by Art. And though a Solution of Silver in purify'd *Aqua Fortis* does uſually afford only a great company of ſmall, thin and ſeemingly ſimple Flakes, like Scales of Fiſh, becauſe Men have not any deſign like ours in procuring the Concretion; yet having diſſolv'd a good quantity of the Metal together, and ſuffer'd it to ſhoot leaſurely and with due Circumſtances, I have obtain'd ſundry Chriſtals, which both were Geometrically figur'd without, and conſiſted of a multitude of exceeding thin Flakes orderly ſticking to one another. And I remember, That whilſt the Objection, I am anſwering, was in my thoughts, I pitch'd upon a yet more pregnant Experiment for the clearing of it. For conſidering, how *Tin-Glaſs*, though a compact and ponderous Body, does naturally conſiſt of a multitude of ſhining poliſh'd Flakes, (which may be eaſily perceiv'd and diſtinguiſh'd by breaking a Lump of it into three or four pieces;) I found by tryal what I expected, That though a maſs of this Mineral were beaten to Powder, yet if it were melted and ſuffer'd to cool of it ſelf, the diſpoſition of the Component Particles would determine them to ſtick to one another in broad and ſhining Flakes, whereof many will be incumbent one upon another, and ſome croſs to one another at various Angles, according as the matter happen'd in its ſeveral Portions to be diverſly refrigerated. And ſome Factitious Bodies may afford us the like Inſtances, as I have obſerv'd in ſome mixtures of Copper, Iron, and other Minerals; and very conſpicuouſly in good *Regulus Martis Stellatus*, whoſe Internal Configuration may be found by breaking it; by which way I have obſerv'd with pleaſure, That the *Regulus* abounded with flat and ſhining Flakes of an almoſt ſpecular Poliſh.

If it be urg'd, to confirm the former Objection, That ſome Lapideſcent Juices, ev'n of thoſe we mention'd in theſe Diſcourſes, do concrete even whilſt Men are looking on; and yet our Stony

Stiriæ, often mention'd (which probably may be alſo haſtily Coagulated) have in ſome places a Streaky and in other places an Angular Configuration of parts; I anſwer Firſt, That I have ſeen divers of that kind of Concretions, which as far as the eye took notice of, were made up of parts confuſedly jumbled together. And next, That (to conſider now thoſe whoſe Texture is more uniform) I have found by Tryals, that, if there be a due diſpoſition in the component Corpuſcles of Bodies to ſuch Configurations, they may be brought to concrete accordingly in a far ſhorter time, than almoſt any, that have not try'd, would expect, not to ſay, believe. Having ſometimes for Curioſity'sſake warm'd ſix or ſevenOunces of *Aqua Fortis*, glutted with fine Silver, 'till the mixture was all brought into a tranſparent Liquor; and having then put the clear but ſtrong Glaſs, that contain'd it, into cold Water, that the Menſtruum might be the more haſtily Refrigerated, I obſerv'd, That when once the diſſolv'd Metal began to ſhoot, the Coagulation into figur'd Chriſtals proceeded ſo faſt, that a naked Eye could ſee the progreſs of it. And having ſometimes put a quantity of Salt and Snow, or of ſome other ſtrongly Refrigerating mixture, into a convenient Glaſs, and wetted the outſide with a ſtrong Solution of Sal Armoniack or ſome Urinous Spirit, though in leſs than a Minute of an Hour it would be Coagulated; yet the Salt, into which it ſhot, had uſually a curious and determinate Figure according to the Nature of the Liquor that afforded it; as I have often ſhew'n the Curious.

Perhaps you will ſay, that theſe Inſtances are taken from Saline Bodies, which are for the moſt part diſpos'd to convene in ſmooth Surfaces, and angular Shapes, and eaſie enough to be wrought on by the External cold; and it may yet ſeem ſtrange to Philoſophers themſelves, what in ſome Caſes muſt have happen'd, if our Hypotheſis be admitted, namely, that external Circumſtances and Accidents, ſuch as the Figure of a Mold or Womb, the coldneſs of the Ambient, *&c.* ſhould viſibly, and ſometimes not a little, diverſify even the internal figuration of cloſe and ſolid Minerals and Gems, without excluding all thoſe that are ſuppoſed to be of a quicker Concretion.

Wherefore to clear this difficulty, it may not be a miſs to ſubjoin an Experiment, that I deviſed to ſhew, that if the Corpuſcles of a Body be ſo ſhap'd as to be fitted by their coalition, to conſtitute ſmooth (and if I may ſo ſpeak) gloſſy Planes, though they be variouſly ſhuffled and diſcompoſed as to their Priſtine order, yet if they be but a little while kept in a ſtate of fluidity, that they may the fitlier place themſelves or be placed by other Agents, they will preſently be brought to convene into ſmooth and ſhining Planes, and the Situation of thoſe Planes, in reference to one another, will be more Uniform and Regular, than almoſt any one would expect in a Concretion ſo haſtily made; notwithſtanding which, their internal contexture will be much diverſified by circumſtances, as particularly the figure of the Veſſel or Mold wherein the fluid Matter concretes.

Conſidering then, that (according to what I noted already) if we break *Tinn-Glaſs* (taken for the *Biſmuth* of the Ancient Mineraliſts) as 'tis wont to be ſold in Lumps in the Shops, it will diſcover a great many ſmooth and bright Planes, (larger, or leſſer, according to the bigneſs of the Lump;) which ſometimes meet, and ſometimes croſs one another at very differing Angles: conſidering this (I ſay) I thought it probable, that a Body, that had already been melted, and was apt to convene into ſuch Planes, not onely would do ſo upon another fuſion, but might have the order and bigneſs of thoſe Planes, diverſified by the Figure and capacity of the Veſſel, I ſhould think fit for my purpoſe. Wherefore having beaten a ſufficient quantity of it to powder, and, when 'twas well melted, caſt it into a good pair of Iron-Molds, whoſe Cavity was an Inch in Diameter, we had a Bullet, which, being warily broken, did, as we expected, ſeem to be, as it were, made up of a Multitude of little ſhining Planes, ſo ſhaped and plac'd, that they ſeem'd orderly to decreaſe more and more as they were further and further removed from the Superficies of the Globe; And they were ſo rank'd, that they ſeem'd to conſiſt of a multitude of theſe rows of Planes reaching every way, almoſt like ſo many *radious's* of a Sphere from the Centre or middle part, to the Circumference: Whereas if we melt Tinn-Glaſs in a Crucible and let it cool there, the Matter being taken out and broken, will appear indeed full of ſmooth Planes, but (as was lately intimated) very irregularly and confuſedly aſſociated or plac'd.

I will not now ſtay to enquire, whether the orderly compoſition of the Planes in our Bullet (which ſome curious Perſons, that I ſhew'd it to, look'd on, as a not unpleaſant ſight,) may be deriv'd from this, that the Matter was coold firſt on the outſide, by the contact of the cold Iron Mold, and the neighborhood of the Ambient Air, and that the coagulation being once thus begun, the parts of the remaining fluid, as they happen'd to paſs by this already coold Matter, with a motion, which, by reaſon of their removal from the Fire, was now ſlacken'd, they were eaſily faſtened againſt the already ſtable parts, (as may be illuſtrated by the concretion of diſſolv'd Nitre and Allom, both about the injected ſticks, and the Grains that firſt concrete againſt the ſides of the Veſſel,) and the refrigeration ſtill reaching further inwards, till it came laſt of all to the middle of the Globe, that being the remoteſt part from the refrigerating Agents; the appoſition was ſucceſſively and orderly made, till the whole Matter was concreted. But, (as I was ſaying) I muſt not now ſtay to inquire, whether the figuration of our Bullet may be explain'd after this or ſome ſuch way: or whether we are not to take in ſome ſubtle or all pervading matter, or ſome other Catholique Agent? For though ſuch points may be well worth diſcuſſing, and we may poſſibly elſewhere ſay ſomething of them; yet here it may ſuffice to ſay; that we have varied the foregoing Tryal by caſting Bullets of ſome other Bodies, (and particularly the ſimple *Regulus* of Antimony) wherein it ſucceeded well enough, though the produc'd contexture were not ſo Uniform as in *Tinn-Glaſs.* And I alſo try'd, that having caſt melted Sulphur it ſelf into a Globous Body of about five or ſix Inches in Diameter, and warily broken it; though one would think it an unlikely Mineral to make any other than a confus'd Concretion, it preſented me great Fibres almoſt like little ſtrawes, whoſe number and (in great part) orderly ſituation afforded me a much leſs unfit Inſtance for my preſent purpoſe than one would have lightly expected. But what I came from ſaying, may ſerve to make out what I propounded to my ſelf; which having named already I need not here repeat.

But one thing more there is, that may be pertinent on this occaſion, namely, That I have broken divers Marchaſites of a peculiar ſort, that were either of a roundiſh, or of an almoſt Cylindrical Figure, to obſerve their internal Structure and Qualifications; whereupon, I found in more than one of them (for I remember not that I did in all) a great many rowes of little Planes or gliſtering Corpuſcles, reaching from the innermoſt parts to the External Surface, and in thoſe that were ſomewhat Cylindrically ſhap'd on the outſide; theſe ranks of Gold-colour'd particles in the ſeveral Planes of the broken Mineral, ſeem'd like Semi-Diameters iſhuing out from a row of Phyſical Points, conceived to be plac'd on an imaginary Line, lying almoſt like the *Axis* of a *Cylinder* between the oppoſite ends, (though I do not well remember how near it reach'd to them:) As if the Cavities of the Chalk or Clay, wherein theſe Marchaſites were found, had made the Soil like a Mold, wherein the Matter of the Marchaſite being detained whil'ſt 'twas in a Fluid form, did afterwards concrete much after the manner that the Bullets of Tinn-Glaſs, *Regulus*, *&c.* did in our Molds. But the proſecution of this

Conjecture belongs to another Diſcourſe.

I ſhall therefore now proceed to a further Anſwer to the formerly raiſed Objection: Whereſore as to the exquiſite uniformity of Shape, which is ſo admir'd in Gems, and is thought to demonſtrate their being form'd by a Seminal and Geometrizing Principle; though I have, in the Second of the above mention'd Arguments, aſcrib'd to them ſuch curious Figures, as argue their having been generated after the way propos'd in our Hypotheſis; and though alſo I willingly allow their ſhapes to deſerve from us a delightful Wonder at the curiouſneſs of Nature's, (or rather her Author's) Workmanſhip; yet upon a more attentive ſurveying of them, I do not find the Uniformity to be near ſo great as is wont to be imagin'd; but have rather met with ſuch Diverſities as agree well with our Hypotheſis about their Figuration.

In ſeveral tranſparent Gems, it ſeem'd manifeſt enough to me, (as I lately alſo noted) that the Shape was, in great part, due to the Figure of the Womb, or Mold, wherein the matter, whilſt liquid or ſoft, happen'd to ſettle. In ſome other tranſparent and well figur'd Gems of the ſame kind or Denomination, and ſometimes growing very near one another, by a diligent Inſpection I found a manifeſt and ſometimes very conſiderable Difference in their ſhapes, either as to the Number, or the Figures, or the bigneſs of the Sides or Planes that made up the reſpective Gems; or as to two; or all, of theſe; comparing theſe deviating Particulars with what would have been in a Stone of that kind or Denomination, that were perfectly figur'd. This I had oppotunity to take notice of, particularly in two ſorts of Stones; the firſt *Granats*; of which I had a conſiderable number brought me out of *America* growing in one Lump of Matter; but in diſtinct parts of it, and without touching one another: Among which I took notice of a manifeſt diſparity of ſhape, and ſo I did in ſome *Affrican* ones, that were preſented me; as alſo in others that were *European*, one which, that was of an extraordinarily large ſize for a figur'd Gem of a tranſparent kind, (for it weigh'd above *Eleven* Drachms and a half,) I conſider'd with a particular attention, and found, that, though it ſeem'd to have been coagulated in a Fluid *Medium*, and to conſiſt of Twelve Planes, at the concourſe of two or three of which it ſeem'd to have been broken off from the Womb or Root; yet it was very far from the *Dodecahedron* of Geometricians: For, whereas that conſiſts of Twelve æquilateral and æquiangled *pentagons*, almoſt all the Planes, that made up our Granat, were quadrilateral and very different from what regularly they ſhould have been, not only in magnitude, but in ſhape: for one of them ſeem'd to have five Sides, and of the reſt, ſome were moſt of kinn to a *Rhombus*, others to a *Rhomboeides*; but the moſt were but little better figur'd than thoſe that the Geometricians call the *Trapezia*. And thus much for the firſt ſort of Gems whoſe ſhapes I obſerved to be not regular. The Second conſiſts of thoſe Chriſtalline Stones, which they call *Corniſh Diamonds*, and which are ſome of them much harder than the *Briſtol Diamonds*, or perhaps than Rock-Criſtal it ſelf; it being eaſie to write upon Glaſs with them. Of theſe Stones having procur'd a good number (many of which I have yet by me,) I took notice, by comparing them heedfully together, that though ſome of them were Geometrically and curiouſly ſhap'd like Rock-Criſtal, having each ſix ſides, whereof every two, that were oppoſite, were throughly like and equal enough to one another; and though the Stone had a Pyramidal termination, made up by ſeveral reſembling and curiouſly figur'd Planes, that terminated in a ſolid Angle or Apex; yet the greateſt number, by much, of theſe Titular Diamonds was made up of Stones, far from being ſo exactly and uniformly ſhap'd, as thoſe newly deſcrib'd. For though moſt of them had ſix long Planes; yet oftentimes the oppoſite ones (beſides that they were not ſo parallel to one another, as they ſhould have been) were unlike and exceeding unequal; and thoſe Planes, that went to make up the *Apex*, though a part, they were uſually angular; yet being compar'd to one another, or to the Regular Patterns above mention'd, their Figures, their Bigneſſes, and their manner of concurring (which was ſometimes not in a Point or *Apex*, but in a Line,) was ſo remote from being uniform, that this great diverſity and irregularity agreed far better with our Hypotheſis, than with its Rival. And yet in theſe Stones, the want of room to coagulate freely in, could not with probability be pretended; for they ſeem'd to have been form'd ſeparately in a fluid Ambient, ſave at the bottom, where they were faſten'd to the Rock, as appear'd by an opacous Root, if I may ſo call it, which ſtill adher'd to moſt of them. And, if I much miſremember not, I have more than once in Diamonds, newly brought from the *Indies*, and ſome of them very fair ones, obſerved a great want of Uniformity in the *Area's* of the Superficial Planes, or in their Figures, or both; and ſometimes too in the very number as well as Situation of their Solid Angles or Corners: about which I hope to recover ſome Notes. And ſo I have done with the *firſt* part of my Anſwer to the above mention'd Objection; whereby it may appear, that there is no ſuch regular and conſtant Uniformity in the Shapes of Gems, but that their Real Likeneſs may be reconcil'd to our Hypotheſis.

But now in the *Second* part of my Anſwer, I ſhall endeavour to ſhew, that the Figuration of Gems may not only *conſiſt with* our Conjectures; but *confirm* them. For, I have more than once taken notice in the *Corniſh* Diamonds I have been mentioning, that ſometimes a ſmall Stone of the ſame kind, has made up, as it were, one Body with a greater; ſo as that the leſſer Stone did not only adhere cloſely to the other, but was, if I may ſo ſpeake, Set or Bedded in it. So that when the Separation was made, there remain'd in the greater Stone a Cavity, whoſe Figure did curiouſly anſwer that of as much of the ſmaller

Stone, as chanc'd to be harbour'd there. And, as ſometimes I obſerv'd, that there was ſuch an adnaſcency, (if you will pardon the Word,) of a Leſſer Stone to a much Greater; ſo at other times, I met with the like of a Greater to a much Leſſer, with a Cavity in the Leſſer, anſwerable to that part of the Greater that had been lodg'd in it. Which, for ought I know, allows us with high probability to conjecture, that the Stone, to which the other grew, was firſt form'd and harden'd; ſince it retain'd its own ſhape, and that, whilſt this remain'd adherent to the Rock or Soil, ſome more Liquor, either that came afterwards by chance into the ſame Cavity, or (in caſe 'twere there before,) that was leſs diſpos'd to an early Concretion, began to coagulate by faſtening it ſelf againſt the Solid Body that was already concreted: Upon which account theſe two Diamonds muſt ſtick cloſe together, and yet be but Contiguous, and a Cavity, ſuch as I freſhly mention'd, muſt be left in the laſt concreted Gem. Which may be illuſtrated by putting into to a ſtrong ſolution of pure Nitre, or Rock-Allom, ſome little ſticks of Wood or any ſolid Body, that may be kept ſteadily in the ſame poſture; for you will ſee many coagulations begin to be made againſt them, and the Criſtals thus concreted will neceſſarily have their Figures incompleat, and have in them Cavities correſpondent to thoſe Parts of the Stick, whereto the Saline Corpuſcles faſten'd themſelves. To which I ſhall only add, that though I have given Inſtances of the adnaſcency of figur'd Stones only in *Corniſh* Diamonds, yet they are not the only tranſparent Minerals, wherein I have been able to obſerve it. And particularly I remember, that I obſerved among ſome Minerals left by a *Gold-Smith* to his Widow, a Fine tranſparent and neatly figur'd Stone, which ſeem'd to be pure Criſtal, but was coagulated about a kind of branching Wire, whereof a good part was incloſed by the Stone, that ſeem'd to grow out of a piece of Ore, that look'd like Silver-Ore, and which the Woman, that was a curious Perſon, upon the ſtrict Inquiry that I made, affirm'd to be, together with the above-mention'd branch, good Silver, produc'd by Nature in that form, (which I thought the more credible, becauſe of the odd and almoſt hairlike ſhape wherein I have ſeen Silver-Ore to have as it were grown;) which will excellently agree with the Reſemblance, I was juſt now propoſing betwixt the coagulation of diſſolved Salts and the liquid matter of Gems, about Stable Bodies partly immers'd in thoſe fluids.

The very many Circumſtances belonging to our Firſt Argument, and the laſt anſwer'd Objection, have ſo long detain'd us, that I doubt, you now think it more than time I ſhould advance to, and diſpatch the *Second* of thoſe Grand Conſiderations, whereon I at firſt intimated our Hypotheſis was founded; And this is built upon the *Weight* of ſome Gems, which being greater than that which ſeems to belong to them as hard and tranſparent Stones, I think we may probably derive it from Metalline or Mineral Mixtures.

I queſtion not, but as you will think this allegation new, ſo you will be apt to queſtion, how I come to know the Truth of what I here deliver; ſince, though Gems are wont to be eſtimated by Lapidaries, as they weigh ſuch or ſuch a Number of Carrats, or of Grains, yet they compare only the weight of this and that Stone of the ſame kind in reference to one another, as the greater or leſſer weight argues the greater or leſſer Bulk, without looking after or knowing how to diſcover the *Specifick* Gravity of ſeveral Gems which depends not on the greater or leſſer Bulk; as (if you know it not already) you will gather from what I am now going to relate.

Conſidering then with my ſelf, that for my purpoſe, it was requiſite to have a Gem as free as I could get from the Metalline Mixtures, that I ſuſpected many pretious Stones to have; and remembring, that Rock-Criſtal, as it is by Mineraliſts reckon'd among Gems, ſo it is hard enough, as I try'd, both to cut Glaſs, and to ſtrike fire, and that its having ſo great a tranſparency, and its being devoid of Colour, makes it exceeding likely to be free from adventitious mixtures; I pitch'd upon it as the Standard whereby to make a *probable* eſtimate of the weight of Gems; and having Hydroſtatically and with a tender Ballance examin'd the weight of it, firſt in the Air, and then in Water, I found its weight to be to that of Water of equal Bulk as *two* and almoſt *two thirds* to one: Which, by the way, ſhews us, how groundleſsly many Learned Men, as well Ancient as Modern, make Cryſtal to be but Ice extraordinarily harden'd by a long and vehement Cold; whereas Ice is bulk for bulk lighter than Water, (and therefore ſwims upon it) and (to add that Objection againſt the vulgar error) *Madagaſcar* and other Countreys in the Torrid Zone abound with Cryſtal.

Having thus found the Ponderouſneſs of Cryſtal in reference to Water, when I met with a colour'd Gem, whoſe Specifick Gravity I gheſs'd to be ſenſibly greater; I ſometimes gave my ſelf the trouble (for a trouble 'tis) to weigh them in the Air and in the Water, and ſo diſcover, whether I conjectur'd aright. And if its Specifick Gravity did much exceed that of Criſtal, I thought it a probable Argument, that there might be ſome Metalline or Mineral Corpuſcles mingled with the ſtony Ones of the Gems, and that alſo it may probably derive its Tincture thence. I will not tell you, that I then found many ſorts of tranſparent Stones *much heavier* than Criſtal: For, beſides that the Tryals were troubleſome enough to make, I chanc'd to fall upon them in a place, where I had not any *ſtore* and *variety* of Gems to examine. But one Inſtance among thoſe that occurr'd to me, I ſhall here ſet down, becauſe being ſo notable, it may ſuffice to ſhew, that, as to *ſome* Gems at leaſt, my opinion of their having an Adventitious Gravity, and conſequently Ingredient, is very probable. I had ſome *American Granats*, which I had a great and peculiar Reaſon to believe had been once Liquid Bodies, and therefore thought them the more worthy to be examin'd; and finding their Colour to be ſo deep, that they were almoſt opacous, and judging by my hand, that they were much heavier than pieces of Criſtal of the ſame Bulk would be, I weigh'd them in a pair of nice Scales in the Air and in the Water, and found them, as I expected, to be almoſt four times as heavy as Water of the ſame Bulk, and conſequently heavier by about a third part than pieces of Criſtal, equalling them in bigneſs, would be. Whence ſo great an acceſſion of ponderouſneſs proceeded, I ſhall tell you, when I come to my next Argument; to which I ſhall advance, as ſoon as I have noted, that though, when colour'd Gems have a greater Gravity than Criſtal, 'tis a probable Argument, that they have ſome Metalline Pigment or other Mineral ſubſtance mingled with them; yet if ſuch Gems have no ſuch ſurpluſage of weight, it will not follow that their Colour cannot proceed from any Mineral Tincture; ſince 'tis not unreaſonable to conceive, that a Mineral Subſtance may be preſent in a Liquor (ſuch as the

Lapideſcent Juice,) that we ſuppoſe Gems to be made of, even when it adds no manifeſt weight to the Body that harbours it; ſince I have obſerv'd (what is odd,) That a Mineral Water, which by its Taſt, its Effects, and the Colour it would ſtrike, appear'd to be richly impregnated with Iron, being carefully by me examin'd Hydroſtatically, did appear very little, (if at all) ſenſibly heavier than Common Water.

The *Third* and laſt Argument, I ſhall now make uſe of, is taken from hence; That out of divers Medicinal Stones, and ev'n out of ſome fine Gems, real and Corporeal Metals, or other Mineral ſubſtances, may be extracted.

Of this Argument I ſhall at preſent ſay the leſs, becauſe the further proſecution of it will be more proper in the Second Part of this Diſcourſe, where I ſhall be oblig'd to handle it with reference to opacous Gems, in which its force will beſt appear. And therefore I ſhall deſire you to take notice, when you arrive at that Part of the ſubſequent Diſcourſe, of thoſe particulars, that may ſerve to ſtrengthen the newly propos'd Argument: And if it be objected, that the Bodies, there treated of, are opacous Stones, not Gems, I have theſe things to anſwer.

Firſt, that divers Stones, that are reckon'd amongſt precious ones, are *opacous* too; as the *Turquois*, the *Onyx*, the *Sardonix*, &c. not to mention divers others, as *Cats-Eyes*, *Opales*, &c. which are as it were Semi-opacous. Beſides I much queſtion, whether Diaphaneity be abſolutely neceſſary to the Eſſence, though it be to the Beauty, of thoſe precious Stones, wherein 'tis uſually found. And I might here make it probable by diſcourſe, that tranſparency and opacity oftentimes depend but upon the manner of the Pigments, diſperſion thorough the ſtony matter of the Gem, and the convenient or inconvenient ſituation of the pores in reference to the beams of Light. But waving this ſpeculative Argument, I ſhall rather take notice, that ſeveral precious Stones, and even Diamonds themſelves, have ſometimes great clouds, which make them in thoſe parts almoſt (if not quite) opacous, without being thereby hinder'd from being true Diamonds or Gems, of this or that kind, to which their hardneſs, colour, *&c.* makes them appertain: And not to mention *Cornelions*, *Agats*, and ſome other Stones that we may obſerve to be (as the tinging Corpuſcles happen to be in a due or an over-great proportion mix'd with the petreſcent matter, and to be Uniformly or inconveniently mingled with it,) ſome of them tranſparent and ſome of them ſemi-diaphanous; I have ſeen worn in a Ring a *Sardonix* it ſelf that was tranſparent, as unlikely a Gem as that is to be ſo. And as for *Granats*, though you know, that both of them are Diaphanous; yet I have had ſome figur'd ones, that ſeem'd quite opacous: and I have others by me of ſeveral Countreys, (where of one very remarkable for its large ſize and Geometrical ſhape,) that are in ſome places Diaphanous, but as to the main bulk of their Bodies appear at leaſt almoſt as dark as ordinary Stones.

I further add, that I little doubt, but that experiments, not unlike thoſe, I ſhall hereafter tell you, I try'd to obtain Mineral or Metalline ſubſtances from Load ſtones, native Cinaber, Blood-ſtones, *&c.* might ſucceed in ſeveral other of the more ponderous Gems, if it were not that the Glaſſy Nature, or exceeding compactneſs of many of them, makes the Mineral Corpuſcles, that are harbour'd in the ſtony and inſoluble parts, to be inacceſſible to our *Common Menſtruums.* And when the Metalline and Mineral ingredient is very abundant, and the Tincture of the ſtony parts not ſo very cloſe, I queſtion not, but even from tranſparent Gems the adventitious Ingredient may, in part at leaſt, be diſſolv'd. And to ſatisfie you about this matter, I ſhall now inform you, that having by the ponderouſneſs of the lately mention'd kind of Granats been induc'd to conclude them impregnated with ſomewhat Metalline, and for that reaſon to think it fit to try, whether I could ſeparate it from them, or otherwiſe diſcover it in them; I kept ſome of them (in a crucible) for a competent time in the fire, and found, that they had exchang'd their Colour, for one not unlike that of unbrightned Iron; and having reduc'd them to very fine powder, and digeſted ſome acid Menſtruums and particularly rectifi'd Spirit of Salt upon them, they afforded me a rich Tincture: Encourag'd by which, I hop'd, that, without their being previouſly burnt, they would in *Aqua Regis* afford a Tincture, and accordingly I obtain'd from crude Granats, (only reduc'd to very fine powder) a rich Solution, which though in colour it ſomewhat emulated a Solution of Gold; yet partly by the Colour of the burn'd Granats and partly by the Taſt of this Solution, I ſuppos'd, that another Metal was likelier than Gold to be the predominant Mineral; and having gently evaporated part of that Menſtruum, I obtain'd from ſome of the reſt certain Criſtals, whoſe ſhape, by reaſon of their ſmallneſs and diſorderly coagulation, I could not well determin; and touching with the Tip of my little Finger the uncoagulated portion of the Liquor, this part of a drop, being put to a great many drops of the Infuſion of Gall, did ſo immediately turn it into a ſubſtance that ſeem'd full as black, if not blacker than Ink, as you would, I think, have been ſomewhat ſurpriz'd to behold.

Which tryal I made to examin the conjectures I had, that one Mineral (for perhaps 'twas not the only, that help'd to conſtitute theſe Granats, was of a Martial nature; which, if it were, I ſuppos'd it would, like other Bodies that participate of Iron, afford with Galls an Inky colour. I tryed alſo with a parcel of ſmall and red tranſparent Stones, which ſome gheſſed to be *Granats*; others, more probably, *Rubies*, that being finely powder'd, they would in an appropriated *Menſtruum*, (made extraordinary ſtrong) give a Colour like that of diſſolv'd Gold. And that there were really ſome parts of the Gem diſſolved in the *Menſtruum*, appear'd not only by the above mentioned colour, but by theſe two indications: The *one*, that having put ſome of this

Liquor to ſome of the ſame ſolution of Galls, I juſt now ſpoke of, it produced indeed, at the very firſt, a dark Colour, but not neer ſo black as that of the *Granats*, and in a trice let fall a copious precipitate that was almoſt white: The *other*, that I was able to precipitate from it, by an urinous Spirit, a reddiſh ſubſtance, which being ſuffer'd to dry in Air, ſeem'd to grow into Bodies, in ſhape not unlike Moſs, and here and there ſmall Muſhrons, all of them prettily colour'd. And from certain *Granats* that were in ſome places opacous, as well as in others Diaphanous, I obtain'd a Solution from whence the ſuperfluous Liquor being abſtracted, the reſidue, which was deeply coloured, did in the cold afford me a kind of ſaline concretions, which yet were not large enough to inable one to determin their Figures.

And on this occaſion I hold it not unfit to intimate, that perhaps, if Men had curioſity enough to make tryals, there would be other tranſparent Minerals found capable of being wrought on by ap-

appropriated *Menſtruums*. For, I do not think, that every ſeemingly glaſſy contexture of a Mineral makes it unfit to be wrought on: For though the clear *Spar*, which in moſt of our Weſtern Lead-Mines in *England* is found next to the Metalline Veins, be at leaſt Semi-diaphanous, and be of ſo glaſſy a contexture, that it uſually breaks into ſmooth and gloſſy *Superficies*, and looks like a *Talk*, and alſo for the moſt part is made up of and preſently reducible into Geometrically figur'd Bodies, ſhap'd like *Rhombus's* or *Rhomboides*; yet ſome other Tryals, that I have made with this *Spar* inducing me to ſuſpect, that 'twas not indeed a *Talk*, but a Body of a much more open Texture, I found, I could diſſolve it in ſeveral Liquors, and particularly in good Spirit of Salt, which would preſently work upon it, even whil'ſt it was in Lumps, and that without the aſſiſtance of Heat; which Obſervation may perhaps give ſome incouragement to ſuch a curioſity as yours.

But by what I have ſaid of the uſefulneſs of *Menſtruums*, I would not have you think, that they are the only Inſtruments, wherewith ſomething Metalline may be obatin'd from ſome Gems: For in an other Paper of mine (to which ſuch tryals more properly belong) you may find an account of ſome attempts of that kind by fuſions and appropriated additaments. And however ſuch Tryals may ſucceed with you that aim at *ſeparating* from a Gem a Metalline or Mineral Body of a determinate *Species*; I can teach you an eaſie way, whereby I have (by the help of fuſion) more than once *manifeſted* in the General, that there may be ſubſtances, partaking of a Metalline nature, in ſome kinds even of tranſparent Gems. And partly by the ſame way, and partly by ſome others, I have been able to determin probably enough, in ſome caſes, that the Mineral ſubſtance is predominant in it.

And here, before I diſmiſs the firſt part of our Eſſay, I think I may poſſibly ſomewhat illuſtrate our *Hypotheſis*, if I briefly mention to you an experiment, I remember I once made to that purpoſe. And it was this: I reduc'd to powder ſome of thoſe *Stiriæ*, that I have often ſpoken of, of water petrified, as it were, ſpontaneouſly: I alſo conſider'd with my ſelf, that I had found Spirit of *Verdigreas*, (which I make without the tedious preparations, that *Baſilius* and others preſcribe, by barely diſtilling without additaments good French *Verdigreas*, and rectifying the obtained liquor) I had, (I ſay) found this *Menſtruum* to be not only (as I elſewhere obſerve) a good ſolvent for many Bodies, but alſo to be diſtillable from many of them, without leaving near ſo much of it ſelf behind, as other Saline Solvents are wont to do: Conſidering this, I ſay, I diſſolved the ſtony *ſtiriæ* in this Liquor, and having ſuffer'd ſome of it to evaporate away, and put the reſt into a cool place, I obtained, as I expected, ſtore of ſmall but finely figur'd and tranſparent Criſtals, that ſhot much after the faſhion of thoſe of the purer ſort of Nitre. With ſome part alſo of the ſtony ſolution I mixed, in a convenient proportion, a high colour'd ſolution of Copper, made likewiſe in Spirit of *Verdigreas*; and theſe two ſolutions being made with the ſame Menſtruum, and warily enough put together, did not precipitate one another, but afforded me, upon the evaporation of the ſuperfluous moiſture, among divers Criſtals that were tranſparent and colourleſs, ſome that were richly adorned with a greeniſh blew Tincture of the diſſolved Metal. What tryals I made by this way, little varied, to imitate nature by aſſociating into tranſparent Bodies ſtony and metalline Subſtances, I cannot now give you a full account of; ſince I neither have by me the Notes, I ſet down about thoſe tryals, nor think it fit to make this firſt part of our Diſcourſe more prolix, than I now perceive it to be already.

SECT. II.

Containing a Conjecture about the Cauſes of the Virtues of GEMS.

WHat has been hitherto deliver'd in the firſt part of our Diſcourſe, will, I ſuppoſe, make it allowable for me to be more ſuccinct in the Second. I ſhall now therefore proceed to thoſe other conſiderations, which, being aſſiſted by what has been already ſaid, may, I hope, ſuffice, to keep our conjecture about the Cauſe of the Virtues of Gems from ſeeming unreaſonable.

And my firſt Obſervation ſhall be, that not only there is in the Earth a great number and variety of Minerals, already dy known by particular Names; but probably there are very many others that are not yet known to us.

The former part of this propoſition will not be doubted by thoſe, that conſider, how great a multitude of Metalline Ores, Marchaſites of ſeveral ſorts, Antimonies, Tinn'd-glaſs, *Fluores*, Talks of various Kinds, Spars, Sulphurs, Salts, Bitumens, *&c.* are mention'd partly by Chymiſts, and other Mineraliſts, and partly by thoſe that have given us accounts of *Muſæums* and other collections of natural Rarities; inſomuch that of only one Kind of Foſſils, the diligence of ſome modern Writers hath reckoned up between two hundred and two hundred and fifty; beſides Animal Stones, as *Lapis Bezoar*, *Lapis Manati*, *Oculus Cancri*, *Lapis Porcinus*, *&c.*

And as for the Second Part of our propoſition or obſervation, you will ſcarce deny it, though you conſider with me but theſe two things.

The firſt is the ſmall and inconſiderable proportion, that the perpendicular depths, depth, that the generality of Mines bears, to the Semidiameter of the Earth, reckon'd to be above 3500 Miles; ſo that, though our Globe were inhabited by ſome hundreds of millions of men more than now it is, and they had curioſity enough to dig Mines every where, and conſequently there were Millions of inquiſitive and laborious men more than really there are, their Spades and Pickaxes would, except here and there, penetrate ſo little a way into the Earth, that a vaſt multitude of Foſſils might, by lying deeper in the bowels of it, continue undiſcover'd.

And to this Firſt Obſervation I ſhall ſubjoin this Second, that, as far as I have obſerved, almoſt every Region affords Minerals of its own, differing from thoſe that are taken notice of in other Regions. And in particular Countryes, as in ſome Shires of *England*, a curious and heedful Eye may, I doubt not, obſerve ſeveral that are not taken notice of by the inhabitants themſelves, eſpecially if well-made borers were diligently and skilfully imploy'd to pierce the ground, and bring up Simples of divers Foſſils that lye hidden under it. But having elſewhere diſcourſed of this matter, I ſhall here only tell you, in general, that in ſome parts of *England*, where I had more opportunity than in others, to exerciſe ſome Curioſity about Minerals, I met ſometimes in a ſmall compaſs of ground, with a much greater variety than I expected, and ſeveral of them undeſcrib'd, that I know of, by any Writer; of which ſort I have received divers others from ſeveral parts both of the old world and the new.

In the next place I conſider, that Nature has furniſhed the Earth with *Menſtruums* and others Liquors of ſeveral ſorts, and indowed it with divers qualities. This I have already manifeſted in the diſcourſe of ſubterraneal Menſtruums, whereto I ſhall therefore refer you; only taking notice in this place, that whereas water is abundantly to be met with under ground, and for the moſt part very copiouſly in Mines, by which it is capable to be variouſly impregpregnated; this liquor it ſelf, eſpecially being thus alter'd, may in ſome caſes act the part of no deſpicable *Menſtruum*, and on ſome occaſions otherwiſe concur to the production of Mineral Bodies.

I further obſerve, that the ſubterraneal Liquors, upon one account or other, (for we need not now particularly determin it) are qualified to work either as Corroſive Menſtruums, or as other Solvents, upon many of the Medicinal Earths and other Minerals they meet with under ground: which Minerals, having never been expoſed to our fires, have their Texture more open, and their parts more ſoluble than thoſe, that have been melted by the violent heats of our furnaces.

And that even Common water will ſuffice to diſſolve, and impregnate it ſelf both with the Saline and oftentimes with Metalline parts, that it meets with in its paſſage, is obvious enough in the differing taſts and other qualities of liquors, that all paſs for common water, whereof ſome is found better and ſome worſe than others, to Brue, ſome to waſh Linnen, ſome to Dye Scarlet, or other determinate Colours; ſome to temper *Steel*, and ſome for other uſes.

But others unqueſtionably more eminent inſtances, are given us by the Mineral Springs, whether *Thermæ* or *Acidulæ*, as Authors diſtinguiſh thoſe that are actually hot, (as at *Bath*) and thoſe that are Saline and for the moſt part ſowriſh (like thoſe at *Tunbridge* and the *York-ſhire Spaw*;) of which two ſorts good ſtore are enumerated by Phyſitians and Geographers; and of which a far greater number would be diſcover'd, if men wanted neither skill nor diligence. And here I ſhall deſire you to take notice, that, though common water do the moſt readily diſſolve the Salts more properly ſo called, though not altogether pure, it meets with in the bowels of the Earth, as we ſee it happens in thoſe Salt-Springs that come not from the Sea; yet there are alſo many others ſubterraneal Bodies, which upon the ſcore of their abounding with Saline particles, will be diſſolved by water, though they be of a compounded nature, and contain very differing ſubſtances; as 'tis plain in thoſe waters of *Hungary* and other Regions, which by the evaporation of their ſuperfluous moiſture, will yield Vitriol, a Mineral not only compounded but decompounded, as containing in it a Saline, a Sulphureous, a Metaline and an Earthly part, (which it ſelf I have found to be none of the ſimpleſt Bodies;) every one of which may be made diſtinctly to appear.

Laſtly, I conſider, that the Petrific Juice or Spirit coming to be in a ſufficient proportion mingled with theſe impregnated waters, ſo as to coagulate them, and concoagulate with them; from their coalition may reſult thoſe precious Stones that we call tranſparent Gems. For 'tis certain, that Bodies, that were a while before in the form of waters, may coagulate into ſtony *ſtiriæ*, of whoſe odorouſneſs and reducibleneſs into lime, I have already given an account in my diſcourſes of Lapideſcent Juices; of which you may command a ſight. And that even Diamonds themſelves, the hardeſt of Gems, were once fluid ſubſtances, the firſt part of this Diſcourſe has, I hope, evinced.

To which I ſhall now add, that procuring ſome petrified Bodies to be brought me from a place in *England*, which I could not be admitted to, I found, that the Petrific Juice or Spirit, that abounded in the Earth of that ſpot of ground, was ſo penetrating, and ſo operative, that it made ſome of the vegetable ſubſtances, that were found in it, in their priſtine ſhape, and, for ought I could perceive, bigneſs, hard enough to cut Glaſs as well as grave on Iron. And 'twas among theſe rarities (if I much miſ-remember not) that I pick'd up a (moderately) tranſparent Body (which I think I have yet by me) that, by the ſhape and other Circumſtances I judg'd to have been a diaphanous Gum, belonging to one of the pieces of petrified wood, that had been brought me, and was hardened to a degree that made it capable of ſcratching Glaſs.

Virtues; *ſince* alſo there is a great difference among theſe impregnating particles and probably of a greater variety of them, than is known to us; *ſince* laſtly divers Gems are not ſparingly but richly impregnated with theſe innobling Corpuſcles, I ſee no ſufficient reaſon, why ſome of the Virtues of divers Gems are not more likely to proceed thence, than from thoſe unintelligible and precarious *ſubſtantial Forms*, to which they are wont to be referr'd.

But becauſe there are ſome difficulties, that the objections of others or my own thoughts have ſuggeſted againſt our *Hypotheſis*; though I neither have time, nor do think it very neceſſary, to diſcourſe amply of them: Yet to clear the way for what I am afterwards to repreſent, I ſhall (though I can but briefly do it) ſay ſomething to each, that may perhaps appear no inſufficient anſwer; eſpecially after I have declared, as I here do once for all, that I ſpeak of the True and Medical Virtues that belong to Gems; and that, as to thoſe Magical and other Extravagant properties, that either notoriouſly fabulous, or other credulous Writers have made bold to deliver, I am ſo far from pretending to afford them an Explication, that I do not allow them the leaſt degree of Aſſent.

This premis'd, let us conſider the chief difficulties themſelves; among which I doubt not but it will be objected, That it is not credible, that the Mineral Subſtances, wherewith our *Hypotheſis* would have Gems to be impregnated, ſhould have any Medical operation at all on the human body, in regard that they are ſo lock'd up that they can communicate nothing to it, eſpecially being indigeſtable and unconquerable by ſo ſmall a heat as that of the Stomach and other parts of the Body.

But to this ſpecious Objection I have ſeveral things to return by way of Anſwer. And firſt of all; had there yet never been any actual Tryal made, whereby to know, whether a Gem be capable of having any Medical Virtues, I confeſs I ſhould find probability enough in the Objection to ſuſpend my

Judgement, till experience ſhould determine the Queſtion. But ſince upon the very credible Teſtimony of eminent Phyſitians and Patients themſelves of my own acquaintance, I find much leſs cauſe to disbelieve, than to aſſent to ſome matters of Fact about the operations of Gems; and *ſince* ſuch matters of Fact do ſtrongly argue in the general, that a Precious Stone may have Medical Virtues; I think, the Objection, as 'tis propos'd in general, is ſufficiently enervated by ſuch particular inſtances, and ought not to keep us from believing upon Experience the poſſibility of the thing denyed; eſpecially ſince there are other things beſides, that may be alledg'd in favour of our *Hypotheſis*.

For it may be conſider'd in the next place, that vigorous Load-ſtones emit copious and very plentiful *Effluvia*; and yet, beſides that ordinary Magnets are uſually a very hard ſort of Stones, I have met with ſome Load-ſtones much harder than ordinary ones, and poſſibly than divers Gems. And 'tis farther conſiderable, that there are Load-ſtones, (ſome of which I can ſhew you,) which do not only work upon Iron and other Magnetical Bodies, but have a manifeſt and inconvenient operation upon Human Bodies, by being worn in mens Pockets or long held in their Hands; as thoſe, that have reſented ſuch operations themſelves, and obſerved them in others, have complain'd to me; which I might confirm by ſome analogous obſervations, if I had time to relate them.

But now I proceed to obſerve, that among tranſparent Pebles, ſome of which, you know, are by being barely well Cut and Set, made to counterfeit Diamonds, I have found ſeveral, that may be brought in a trice to emit copious and even ſtrongly ſented ſtreams. And if you allow the opinion of the generality of Modern Philoſophers, who aſcribe Electrical attractions to the *Effluvia* of bodies excited by rubbing, you will, I preſume, allow me to infer, that very light alterations may ſuffice to procure Expirations even from tranſparent

Gems: Many of which are Electrical, and ſo are the hardeſt of them, Diamonds themſelves; one of which I keep by me, that upon a little friction attracts, vigorouſly enough to be wonder'd at by the Spectators.

And as to that part of the Objection I am anſwering, which contends, that Gems are not to be digeſted or conquered by the heat of the Stomach; I will not ſtay to examine, whether and how far the digeſtion of things in the Stomach be to be aſcribed to Heat, contenting my ſelf to ſay at preſent, that, to make the Objection valid, it ſhould be firſt proved, that ſuch Bodies cannot have any operation upon the human body as paſs thorough it, without any ſenſible change of bulk, figure, &c. as Gems that are ſwallowed down are ſuppoſed to do. For, we know, that ſome Chymiſts make Bullets of the *Regulus* of Antimony (which we alſo have made, and obſerv'd ſomething odd about them) which they call *Pilulæ perpetuæ*, becauſe when they have performed their operation in the Body;

and have been ejected with the Excrements, they are by ſome more thrifty than cleanly perſons, waſhed and employ'd again and again to the former purpoſes. Nor do we know, what Analogie there may be between ſome Juices in the Body, and ſome of the Mineral ſubſtances that impregnate Gems with their Virtues.

For, though the *Oculus mundi* be reckon'd by Claſſic Authors among the rare Gems, (as indeed good ones may be juſtly accounted Rarities;) yet if one of the beſt ſort be but a while kept in common Water, it will, as Experience aſſures me, receive an alteration obvious to the Eye. I might here alledge the concurrent Authority of many, and the common Practice of moſt Phyſitians, who in their publick Diſpenſatories as well as private Preſcriptions, ordain the Fragments of precious Stones to be taken inwardly, upon the ſcore of the Cordial and other Virtues they aſcribe to them. But I ſhall rather make uſe of leſs queſtion'd Arguments, and without inſiſting on the manifeſt operation, that the Juices of the Body have not only on the Chalibeat preparations, where the Metal is preſum'd to be open'd, but upon crude Steel it ſelf; or urging the Examples of *Lazarus Vitri-Vorax*, or the devourers of Stones, as being rare ἰδιοσυγκρασίαι; I ſhall proceed to acquaint you, that with a faint Liquor, diſtill'd from a Vegetable ſubſtance, as temperately qualified and as plentifully eaten as Bread, I have obtain'd, and that without Heat, from divers hard Bodies, and amongſt them from a tranſparent ſort of Gems, a manifeſt Tincture. And whether ſome Juices of the Body, aſſiſted by the Natural Heat of it, may not, in reference to *ſome* Gems, ſerve for extracting *Menſtruums*, though it may well be, more then either I or the Objectors certainly know, yet the Inſtance, I come from alledging, favours our *Hypotheſis* more than theirs.

And even the Natural Heat of a human Stomach, nay perhaps the outward parts of the Body, may be able, though not to digeſt precious Stones, yet to ſolicite out ſome of their Virtues; ſince I am ſure it makes a ſenſible alteration in the hardeſt ſort of them. For I have a Diamond, whoſe Electrical faculty may be excited not only by rubbing, but, without it, by a languid degree of adventitious heat. And I have had in my keeping a Diamond, which by Water, made a little more than Luke-warm, I could bring to ſhine in the dark.

Object. If it be further alledged, that, though ſome Virtues may be conceded to Gems upon the account of the Minerals that impregnate them, yet it will be no way likely, that their Virtues ſhould be ſo Various and Great, as even the modeſter ſort of Authors pretend. If this, I ſay, be alledged, I ſhall readily acknowledge, that I do not think others or my ſelf obliged to believe all the ſtrange things, that even ſome Learned Writers do ſometimes aſcribe to Gems: And if any man will think, that ſome of them are fabulous, and more of them Hyperbolical, he may ſooner find me his Aſſociate than his Adverſary in that point. For the Rarity of tranſparent Gems, their Luſtre, and the great Value, which their Scarceneſs and mens Folly ſets upon them, imboldens ſome to *ſay*, and inclines others to believe, that ſuch rare and noble Productions of Nature muſt be endowed with proportionable, and conſequently with extraordinary Qualities.

But this being freely granted, I anſwer to the Objection; *Firſt*, that 'tis not improbable, that there may be in the Earth a much greater Variety of Minerals diſſoluble by the ſubterraneal Menſtruums, and capable of concoagulation with Petreſcent Juices, then Authors have yet taken notice of: To which conjecture divers ſubterraneal productions, that I have met with, doe ſtrongly incline me. And from the *number* and *various mixtures* of theſe may proceed not only a great Variety of operative particles in precious Stones, but a high degree of Energy in ſome of them.

And *next* I conſider, that the Efficacy of thoſe Mineral Tinctures or Solutions, that are already known to us and may be concoagulated with the

Petreſcent Juice, may be reaſonably preſum'd to be much greater in ſome Gems, whereof they became Ingredients, whil'ſt they were (as Chymiſts ſpeak) *in ſolutis principiis*, than may be expected in our Shops or Laboratories from the vulgar Solutions of the ſame Metals or Minerals, after they have by vehement Fires been reduced into Gold or Silver, or Lead, or Antimony, &c. For, whereas in theſe vehement Fuſions, requiſite to bring Metalline or other Ores into ſuch ſubſtances, the volatile and ſpirituous parts are wont to be driven away, and the remaining Body becomes more hard and compact, and has his Virtues as it were locked up: In the ſtate of Fluidity thoſe ſubtle and efficacious parts are preſerved, and united to the other Ingredients of the Gems, whence ſome Emanations of them may be eaſily enough drawn out: As in the inſtance I not long ſince mentioned, of the eaſie eduction of ſtrongly ſented Steams from Pibbles ſo hard, that I found them more diſpoſed to ſtrike Fire, than Flints themſelves, that are uſed in Guns. And from the greater or leſs plenty, and natural activity of the impregnating particles in this or that Gem, may problably be deduced the difference in Colour of ſome, and in Virtue of other Stones of the ſame denomination: Of which we have in a Learned Writer or two, eminent Examples given us, of the great Virtue of ſome, and the inefficacy of other, that Experience has diſcovered, among thoſe Stones that go under the Title of *Lapis Nephriticus*. For, though they be not properly tranſparent Gems, yet the Analogy betwixt them and thoſe that are, ſeems ſufficient to warrant the mentioning of them on this occaſion.

See *Unzerus de Nephritide.*

And here we may ſubjoin two things, in favour of both the foregoing anſwers: the *Firſt*, that for ought we know, the Petreſcent Juices themſelves may have all that is requiſite to make them ſuch, and yet have diſtinct Natures, and be indowed with peculiar qualities, abſtracting from thoſe which they acquire upon the ſcore of their coalitions with adventitious Liquors. This I cannot ſtay to make probable by the differences I have obſerved in Petreſcent fluids, and therefore I haſten to the Second.

The next thing which I would repreſent, is, that having obſerved Petrific Liquors or Spirits to pervade and give a high degree of hardneſs to bodies, that chanced to lie within their reach, though one would have thought them ſufficiently indiſpos'd to receive ſuch an induration; I ſee no abſurdity in ſuppoſing, that ſometimes ſuch a Liquor may invade, permeate and ſubdue tranſparent Minerals, abounding in Saline, Sulphureous, and Bituminous particles; which conſequently being duly excited, may be made to emit their more ſubtle and more active parts. And as I have cauſe to think, that ſubterraneal Fires and *Menſtruums* do divers times make various compoſitions and decompoſitions in the Earth, (as 'twere not hard for me to ſhew, if I had leiſure;) ſo 'tis not impoſſible, but that the Spirit, we have been ſpeaking of, ſupervening, may mingle it ſelf with ſuch Bodies and petrifie them together with it ſelf into Gems. On which occaſion, I remember, that I have had Salt, made by nature in the bowels of the Earth, juſt like that which Chymiſts compound by Art on the ſurface of it. And I have ſometimes made by an eaſie operation and a moderate degree of Fire a certain compoſition of *volatile particles* of Salt and Sulphurs (ſome of which I have yet by me) which after diſtillation did in a fluid *Medium* ſhoot into Cryſtals tranſparent, and more curiouſly figured than I have ſeen divers natural Gems to be. So that, if either beneath or upon the ſurface of the Earth, ſuch kind of ſubſtance happen to be pervaded and ſubdued, by a clear petrifying Liquor; we may well preſume that the reſulting concretions may be indued with Qualities, as well uncommon for the Kind, as conſiderable for the degree.

Objection. If it be yet objected, that it is very unlikely, that Gems ſhould part with any Effluvia or portions of themſelves, ſince they loſe not of their weight, and ſome of them are very little heavier than Cryſtal it ſelf, and conſequently are not like to have much adventitious ſubſtance to part with: I might leave the anſwering of one part of the Objection to Phyſitians and Chymiſts, who teach, that the Antimonial Glaſs and Cup imbue Wine and other Liquors with a ſtrong emetic quality without any ſenſible loſs of weight. But having elſewhere ſpoken of thoſe things; I ſhall rather here demand, whether the Objectors have tryed the truth of what their Argument ſuppoſes by any way ſufficiently accurate? For I much doubt, that that has neither been attempted, nor would be found eaſie to be performed. And till due tryal be made, let me repreſent, that though they will not allow common Water to be a *Menſtruum* fit to draw any thing with from ſuch a Body as Mercury, which is wont to mock the Chymiſts *Aqua Fortis* and *Aqua Regis*; yet both *Helmont* and others inform us, that Mercury kept for a day or two in common Water, or boiled a while in it, though it be taken out without any ſenſible diminution of weight or bulk, will have imbued a conſiderable quantity of Water with a Virtue of killing Worms; for which purpoſe 'tis much uſed, and often with good ſucceſs in a great Hoſpital in *London*, as the Chief Phyſitian of it (a very judicious and experienced man,) has more than once informed me.

And as for the lightneſs, that is objected againſt ſome Gems, beſides that it may ſafely be granted, that *cæteris paribus* ſuch may have fewer or more languid Virtues than others of the ſame kind; it may alſo be anſwered, that the adventitious ſubſtance that impregnates the Petreſcent Juice, may be of ſo ſmall ſpecific gravity, as not to make the Gem at all heavier in *ſpecie* than Cryſtal it ſelf. For this, (as we have formerly obſerved,) being about two times and a half heavier than common Water of the ſame bulk, I have hydroſtatically found, that divers Salts and ſome other Mineral ſubſtances are of leſs ſpecific gravity; and conſequently, if they were concoagulated with the Petreſcent

Juice that hardens into Cryſtal, need not increaſe the ponderouſneſs of it, and yet may imbue it with conſiderable Vertues: Nor is it neceſſary (to add that *in tranſitu* on this occaſion) that, not to alter even the colourleſneſs of Cryſtal or the colour of another Gem, the adventitious ſubſtance ſhould be purely Saline: For I have divers times made Bodies, which, though tranſparent and colourleſs like Cryſtal, and ſometimes curiouſly and regularly figur'd, were yet of a compounded Nature, and particularly abounded with an eaſily ſeparable and ſtrongly ſented Sulphur. But to give yet a farther and more direct anſwer to the Objection; I ſhall add, that though, when a Gem has much more ſpecific gravity then Cryſtal, or will ſuffer an adventitious Mineral to be ſeparated from it, 'tis a very probable Argument, that the Petreſcent Juice is that Body compounded with an adventitious ſubſtance; yet it will not neceſſarily follow, that, when neither of theſe Signes appear, the Gem is quite devoid of any ſuch ſubſtance. For, (according to what I elſewhere declare,) the Petreſcent Liquor, it mainly conſiſts of, may be impregnated not with the groſſer ſubſtance, but with the finer and more ſpirituous part of the Mineral, without having the ſpecific gravity ſenſibly increas'd. Of which I remember I ſhew'd a notable Inſtance to ſome curious perſons, at a Mineral Spring, which many were then drinking of by the Adviſe of Learned Phyſitians for ſeveral Diſeaſes. For though this Water both by it's Inky taſte, by it's blacking the Excrements of thoſe that drank it, and by other Signs appear'd to participate richly enough of Iron; yet the ferruginous particles, it abounded with, were ſo light and ſpirituous, that not only they would, as I tryed, be eaſily loſt, if the Liquor were kept too negligently ſtopt; but when I came whilſt the Spirits were yet there, (it being but newly taken from the Spring it ſelf) to examine it hydroſtatically with very good Scales and much diligence, I convinc'd the *Virtuoſi* that aſſiſted, that this ferruginous Water was very little, if at all, heavier *in ſpecie* than other Water, which was brought as common Water to be compared with it, and examin'd with the ſame Scales and after the ſame manner.

And now, if you recall to mind what I have elſewhere ſaid partly of the Atmoſphers of ſolid Bodies, and partly of the great Efficacy of Effluviums; I hope, you will not think it abſurd to conjecture, both that ſome precious Stones may have Medical Virtues, and that divers of theſe may be aſcribed to the Mineral ſubſtances, whereof they participate or conſiſt; and eſpecially to thoſe, which are beſt fitted to exert their powers by the copious Effluxions of their more agile and ſubtle parts.

And by this time it may be ſeaſonable to tell you, that though, what I have hitherto diſcours'd do chiefly belong to tranſparent Gems; yet divers of the things already deliver'd may, with no great alteration, be applied to opacous Gems: of which I ſhall ſpeak much more briefly, not only for the reaſon juſt now given, but becauſe, if we have ſhewn (as I hope we have) that even Diaphanous Gems may be indowed with Virtues by the Mineral ſubſtances they contain or are in part made up of; the Arguments will hold more ſtrongly as to opacous Gems: both becauſe theſe are for the moſt part much leſs hard than the others, and becauſe 'tis far more eaſie to ſhew by their ſpecific gravity, and the compoundedneſs of divers of them, that the dark ones, than 'tis that the clear ones, may partly, and ſometimes plentifully, conſiſt of Mineral ſubſtances, imbodyed with, and hardned by Petreſcent Juices or Petrific Spirits.

In favour of this Doctrine, I ſhall endeavour in the firſt place to ſhew, that what has been deliver'd is *poſſible*; and afterwards ſet down ſome particulars to make it *very probable*.

The firſt part of my Taſk might be eaſily performed, or perhaps would be needleſs, if I were ſure, you had no need to be told of any thing I have written about *Lapideſceut Juices*. But for greater ſecurity I ſhall in this place briefly intimate, that among the Kinds of thoſe Liquors, I have obſerved a ſort that is of ſo fine a ſubſtance, and yet of ſo Petrifying a Virtue, that it will penetrate and petrifie Bodies of very differing Kindes, and yet ſcarce, if at all, viſibly increaſe their bulk, or change their ſhape or colour. To which purpoſe, I remember, that I have ſeen divers Animal and Vegetable ſubſtances ſo petrified, as ſcarce at all to be taken notice of, by their appearance, to have been alter'd by the operation of the Petreſcent Liquor. I have with pleaſure ſeen a thin Cream-Cheeſe turn'd into Stone, where the Size, Shape, and Colour even of the Wrinkles, and the blewiſh Mold (which it ſeems it began to have when the Liquor invaded it) were ſo well preſerv'd, that an hungry man would not have ſcrupled to have fallen upon it for a good Bit. And as for the hardneſs, that this Petreſcent Juice can give to the Body that it penetrates, I ſhall now only remind you of what I lately told you: That I have had, (and I think yet have in another place) a pretty a pretty quantity of Wood petrified in *England*, which retaining its former figure, and grain, and ſcarce at all viſibly increas'd in bulk, was ſo very hard, that I could make Impreſſions with it upon Iron, and Glaſs it ſelf, and make it ſtrike Fire like an excellent Flint. To which I ſhall here add, that the ſtony parts did not ſuffer the Wood, which they had penetrated, to be reduced in the Fire, either to Aſhes or Charcoal. And I have by me a lump of Mineral Subſtances, wherein a Petreſcent Liquor, that fills the large intervalls between them, is tranſparent enough, and harder than moſt Stones, as far as we could gueſs by ſome tryal of it made by a skilful Ingraver of Gems.

And to theſe inſtances might be added many others, if it did not by theſe few ſufficiently appear, that Petrifick Agents may inſinuate themſelves into the pores of various Bodies, and turn them into Stone, without otherwiſe deſtroying their priſtine Nature, or ſo much as their former Figure.

Wherefore having in general ſhewn

our *Hypotheſis* to be *poſſible*, we may now deſcend to four or five particular Arguments, that 'tis hoped may help to render it very *probable.* And theſe I ſhall fetch *partly* from the great ſpecific gravity of divers opacous and medicinal Stones; *partly* from the fitneſs of our *Hypotheſis* to render a reaſon of divers *Phænomena* relating thereunto, ſome of them ſcarce at all, and others much leſs probably to be accounted for without it; *partly* from the Metalline ſubſtances to be manifeſtly ſeparated or obtained from the Stones we are treating of; and *partly* from the Nature of the Bodies whereof Medicinal Stones ſeem to be compounded.

Arg. I. That the ſpecific gravity of divers opacous Stones, whereunto Medicinal properties are aſcribed, is very conſiderable, is a Truth, which, if thoſe that have writ ten of ſuch concretions had been vers'd in Hydroſtaticks, & had had the curioſity to examine them that way, they might have eaſily diſcover'd; as will quickly appear by particular Examples: Before the mention whereof, of, it will be fit for me take notice to you, that conſidering with my ſelf that white Marble is generally allowed to be a pure and ſolid Stone, and upon the ſcore of its whiteneſs is likelier than moſt others to be free from Mineral mixtures, I thought, I might at leaſt as well pitch upon that as on any other for the ſtandard of the ſpecifick gravity of opacous Stones, as they are meerly ſuch. And accordingly having weigh'd a piece of white Marble in Air and Water, I found it to be in weight to an equal bulk of that Liquor very near $2\frac{72}{100}$ to 1, or, (that the proportion with very little errour may be the better remembred,) as two and ſeven tenths to one. And to make trial in a Stone uncoloured, but, becauſe harder, ſuppos'd to be of a cloſer Texture, we examin'd a fine white Pible, which we found to be to an equal magnitude of Water as two and above ſix Tenths to one. This being determin'd, 'twas not difficult for me to think, *both* that divers Bodies, that commonly paſt for *meer* Stones, are more ponderous than white Marble of the ſame bulk; and that, if there were any ſuch great ſurpluſage of ſpecific weight, as I gheſt, many will be found to have above that of Marble, it might proceed from ſome Metalline Body, though not viſibly, yet really, and perhaps plentifully mingled with the Petreſcent matter of theſe Stones. The later part of this Conjecture will hereafter be confirm'd in the *third* Argument; which makes it unneceſſary for me to give you now of the former more than a few inſtances: which I ſhall ſoon diſpatch by telling you, that I quickly found by weighing the following Minerals, firſt in the Air and then in the Water, that a *Blood-ſtone* (bought at the Druggiſt) was in weight to Water of the ſame bulk as $5\frac{7}{10}$ to 1; The *Load-ſtone*, I then tried, (for all are not equally heavy *in ſpecie*) as 4 and $\frac{6^{ths}}{10}$, to 1; *Lapis Calaminaris*, us'd for Rheums in the Eyes, and to turn Copper into Braſs, as $4\frac{7}{10}$ to one; *Lapis Tutiæ*, as they call it, which is alſo much imploy'd in Rheumatick Eyes, as very near 5 to 1.

But here I muſt advertiſe you, that I have not found the proportion of each of theſe bodies and water to be any thing near conſtantly the ſame, but ſometimes to differ very much in particular Stones of the ſame kind; which agrees very well with our *Hypotheſis*. For, according to that, thoſe particular Stones, that happen to partake more plentifully of Mineral ſubſtances heavier *in ſpecie* than Stone as ſuch needs to be, ought to be more ponderous than others of the ſame kind that are not ſo qualified: I ſaid, *heavier in ſpecie than a Stone, as ſuch need to be*, becauſe there are ſubſtances that are reckon'd among Minerals, and are capable of endowing the ſtony matter, wherewith they are coagulated, with Medical Virtues, and yet thoſe ſubſtances may make the Stone or aggregate, whereof they are made, not to be heavier but lighter *in ſpecie*. From Jet, which in ſome parts of Europe being found in Quarries of Mines is indeed a foſſile, which is wont to be reckon'd among Stones, and by many worn as a Gem; I obtain'd no inconſiderable proportion of oil: and having weigh'd choice Jet it ſelf in water, I found it to be bulk for bulk to that Liquor but as 1$\frac{22}{100}$ to 1. And there are ſome other foſſils, hard as Stone and polliſhable as Marble, from which I have by diſtillation obtain'd two kinds of Oil, whereof one was lighter than common water; which ſhews, that even bituminous and light ſubſtances may be ingredients of a Stone: And that Salts, which are moſt of them leſs heavy *in ſpecie* than white Marble, may plentifully concurr to the making up of Stones; I ſhall have occaſion to manifeſt at the cloſe of this Diſcourſe by thoſe Stones, whereof we in *England* uſe to make *Vitriol.* The foregoing Reflection I have here touched upon, becauſe I would intimate to you, that Stones that are lighter *in ſpecie* than white Marble may be compounded of foſſils whence they may derive peculiar Qualities, at the ſame time when I tell you that in my opinion ſuch Stones as are conſiderably more heavy *in ſpecie* than Marble may afford us a ſtrong preſumption of their owing their gravity to the mixture of Metalline or Mineral ſubſtances. And this may ſuffice for our firſt Argument.

Arg. II. The next ſhall be taken from the conſideration of ſome *Phænomena*, (relating to Medicinal Stones) which agree very well with our *Hypotheſis*, and will ſcarcely be very well explicated without it.

And 1. As to *Tranſparent* Gems themſelves, I have learn'd by inquiry of Travellers, that have viſited thoſe parts of the *Eaſt Indies*, where they grow, that ſometimes one ſort of Gems, ſometimes another, and ſometimes alſo Diamonds themſelves are found included in the Rocks where they are digg'd for, or in the midſt of hard looſe Stones, which muſt be broken in pieces, to take out the Diamond or other incloſed Gem: Which *Phænomenon* will be hard to be accounted for, unleſs by our *Hypotheſis*; according to which it may rationally be ſuppoſed, that the Gem was firſt formed either in Earth or ſome other ſoft and eaſily permeable ſubſtance, which being afterwards pervaded by ſome Petrific juice or Spirit, was turn'd into Rock or looſe Stones, according as the Earth and other ambient matter chanc'd to be an intire and coherent maſs, or divided into clods & other portions. And I remember, that the Governour of an *American* Colony, having ſent me among other Rarities, digg'd up in his Countrey, an odd kind of Mineral, that ſeem'd more ponderous than at firſt ſight it promis'd, I had the curioſity to break it, and found in it, here and there, ſeveral Gems, which by their figuration and ſome other circumſtances were concluded to have been form'd there, before the ambient Mineral had obtain'd the nature it then appear'd to be of. And in *Opacous* ſtones it may hence happen, that a great lump of Medicinal Earth may be invaded and petrified after the newly mention'd manner; ſo that it may not be thought incredible, that ſome of theſe Medicinal Stones ſhou'd be very large in compariſon of others: As I remember, that an ingenious Phyſitian told me of a Spleen-ſtone, as they call them, in the hands of an acquaintance of his (where I might have ſeen it, if my occaſions had permitted,) amounting to about four-ſcore pound weight. And on this occaſion, I alſo remember that even in a Medicinal Stone, much harder and heavier than Marble, and whereof I have ſeen lumps far greater than I could lift, I remember, I ſay, that having had the curioſity to cauſe a pretty big piece, violently broken off from the maſs whereto it belong'd, to be ſawn aſunder, that I might conſider the internal Textures, as far as 'twas viſible; I found ſeveral empty Cavities of differing ſizes and figures in the ſolid ſubſtance of the Stone, (which I think I have not yet loſt:) which ſeems to argue, that this compact and ponderous Body was made of a ſtony nature by the ſupervening of ſome Petreſcent Liquor or Spirit, upon porous Earth or ſome other conſiſtent ſubſtance. For if it had been a meer Liquor wherein thoſe Cavities muſt have been ſo many aerial bubbles; 'tis not like that ſome of them ſhould have ſuch irregular ſhapes,and that all ſhould have continued without emerging to the top.

2. Our *Hypotheſis* will alſo help to render a reaſon of what ſeems exceeding difficult to be explicated; namely, How ſome Gems, that ſeem to be intire Stones, are in part of one colour, and in that, which is contiguous to it, of a quite differing: Of which ſort we have the *Sardonix*, and ſome other opacous Gems. And I have obſerv'd the like, though very rarely, in diaphanous ones. For, according to our *Hypotheſis*, it may be ſaid, that a portion of matter, imbued with one of the Tinctures of the parti-colour'd Gem, was firſt form'd, and afterwards, ſome Petreſcent Juice, endowed with another colour, came to ſettle contiguouſly to it, and ſo by accretion made up one Stone with it. I might illuſtrate this by telling you, that though Fire do make a far greater agitation of Bodies melted by it, than need be ſuppoſed in cold Petreſcent Liquors, yet I

have found in making Artificial Gems, that by ſome miſchance or error in the operation, the Mineral pigment has richly tinged one part of the tranſparent maſs, without at all imparting that colour to the very next part to it; ſo that if I ſhould ſhew one of thoſe I I have yet by me, you would judge it to conſiſt of two differing Gems ſubtlely glewed or faſten'd together, unleſs you ſhould in vain try as others have done, to diſcover by the Eye or otherwiſe ſome naked commiſſure, which may keep thoſe ſo differingly colour'd Bodies from making up one intire maſs.

But let us leave theſe Artificial Gems, and add to what I was ſaying about our Natural Ones, that the Union of parts in theſe Reſulting Stones (if I may ſo call them) I was ſpeaking of before, might be the more perfect, if the ſupervening matter found not the firſt form'd Stone to have attain'd to its full induration: Though, for ought I know, even in this caſe, the appoſition may be ſo cloſe, and the two matters ſo near of kin, that both may paſs for one Stone, and be poliſh'd both together without any blemiſhing diſcontinuity of ſurface at thoſe parts, where one would expect commiſſures. For I have by me a lump, wherein there plainly appear Stones of colours very different from each other, that were once diſtinct and incoherent; but by ſome petreſcent Liquor have had all their intervals ſo exquiſitely filled up, that neither the touch nor the Artificers Tool, the lump being now ſawen aſunder, diſcovered any Commiſſures; but the whole Maſs bears an uniform Poliſh, and is harder than divers Gems that are worn in Rings, readily enough ſtriking Fire with a Steel. And to confirm this the more, I ſhall add, that in a place where a prying perſon of my acquaintance lighted on this portion of petrified matter, he found not only other lumps, but divers looſe Stones, that ſeem'd altogether of the ſame nature with thoſe, that by the ſupervention of the Petreſcent Liquor were united into ſtony maſſes. I have alſo had a curious *Agat* ſo form'd, that it ſeem'd highly probable, that the opacous parts of its matter had been ſome thin, but not altogether contiguous, Beds of fine Clay, or Earth, lying almoſt parallel to each other (but not to the *Horizon*,) which by ſome Petreſcent Liquor, that chanc'd to ſettle there, was reduced to coagulate with it into a partly opacous and partly diaphanous Stone. And of ſuch Clays or Mineral Earths, I have ſometimes with pleaſure obſerved more than one or two, which, though diſtinct and perhaps of differing colours, were ſo very thin, that the thickneſs of them all did ſcarce exceed an inch, nor did they always lie flat or horizontally, but in differing poſtures both in reference to the *Horizon*, and one an other, and now and then the exterior ones did ſucceſſively almoſt ſurround the interior: And of theſe thin Couches or Layers of Earth, I remember, I have obſerv'd a conſiderable number, within a very ſmall compaſs of ground. I muſt not in this place ſtay to ſhew, how probable 'tis, that much after the ſame way may be explicated the production of divers other Gems beſides *Agats*, as *Chalcedonians* and *Jaſpers*, which are for the moſt part opacous, but oftentimes have ſome parts that are not ſo. But I am content, before I go further, to mind you on this occaſion of what I elſewhere deliver, That by purpoſely calcining, without breaking, ſome of theſe Stones, whoſe greater part was diaphanous, I found, that the tranſparent parts turn'd white; and that ſome of the thin Layers or Couches of Mineral Earth had retain'd their colour as well as poſition, and had it much heighten'd; ſo that one of theſe Layers after calcination was of a very rich and permanent Red. And this difference of Colours I obſerv'd not only in Layers, but in the Specks and irregularly ſhap'd Clouds (if I may ſo call them) of other Colours (as Greeniſh, Blewiſh, &c.) I might here add, that I have found ſhining *Marchaſites*, not only in other ſolid Stones, but in Marbles; as alſo Flints themſelves, incloſed in great maſſes of Marble, and likewiſe Wood; in ſtrong Stones imploy'd to build a Wall, and Shells (at leaſt as was judg'd by their ſhapes and ſizes;) in a great maſs of Stone that I met with almoſt on the top of a Hill remote from the Sea, together with divers other ſuch *Phænomena*, which I think may probably be accounted for by our *Hypotheſis* and ſcarce without it. But being willing to diſpatch this Diſcourſe, and unwilling to intrench upon the Diſcourſe of the *Effects of the Petreſcent Juice*, (to which the conſideration of theſe and divers other *Phænomena*, to be met with about the Generation of Stones and petrified Bodies, eſpecially in Wombs or Molds, more properly belongs;) I ſhall in this place only point back to one *Obſervation*, and anſwer one *Objection*; becauſe both of them are pertinent to our preſent Diſcourſe.

The *Obſervation* is this: That even in tranſparent Gems, and which is more, of the ſelf ſame *Species*, I have ſometimes taken notice of ſuch an Aggeneration or Accretion of Stones to one another, as argues their having been produc'd at ſeveral times. For proof of this, I need no more than referr you to what I have not long ſince, related about thoſe *Corniſh* Diamonds, wherein ſometimes a leſſer Stone, though Geometrically ſhap'd, was found in good part inclos'd in a greater, as well as in part alſo extant above it. Whence I argued, that the production of this aggregate of two Cryſtalline Bodies was not made all at once, but ſucceſſively, and that the leſſer was firſt form'd, which I ſhall now confirm by this Conſideration. That if the greater Stone had been firſt harden'd, the matter of the leſſer muſt only have exteriourly ſtuck to it, and been as it were imboſt upon it; but could not have made it ſelf in the ſubſtance of the greater a Bed or Mold, eſpecially of ſuch a Geometrical figure as it ſelf had not yet received. *Page, 76, 77, & 78.*

And though this ſucceſſive Generation of the parts of (ſeemingly) intire Gems may appear to you ſomewhat new and ſtrange, yet that its fitneſs and requiſiteneſs to explain the foregoing

Phænomena and others, to be hereafter mentioned, may the more recommend it to you; I ſhall add, that perhaps you may be aſſiſted to conceive, if not invited to admit it by a Mechanical illuſtration. For we ſee in divers Chymical Solutions, as of Salts and other Bodies, that there are certain ſtages or periods of coagulation; ſo that, when ſuch a quantity of the ſuperfluous moiſture is exhal'd, eſpecially upon any conſiderable refrigeration or other favourable circumſtance, thoſe particles that are moſt diſpos'd to coagulation will convene and ſhoot into Cryſtals, after which no more will do ſo, till a farther and more conſiderable evaporation of the water or other *Menſtruum* be made; upon which will enſue a new Cryſtallization of the parts. And I can ſhew you the productions of a metalline, but uncommon Solution, that I ſo made in an appropriated Liquor, that the firſt ſhooting afforded me a Layer or Bed of curiouſly figur'd Cryſtals, and the following, another Layer of fine Cryſtalline Bodies, that have faſten'd themſelves to the former, but differ notably from them both in ſhape and poſture. And in this Experiment, the diſſolv'd Body was but one, as the *menſtruum* but one; but if there be a diverſity of nature in the Liquors that make up a *menſtruum*, or in the Bodies that are diſſolved in it; ſome of the Corpuſcles may convene either a part with thoſe of the ſame Nature, or mingled with thoſe of a differing Nature; but yet at the ſame time and ſo make up Cryſtals of a compounded Nature, and ſome of them may convene with homogeneous particles, but at differing times; and ſo miſs of ſuch uniformity as might elſe appear in their concretions. Which may be illuſtrated by what I have elſewhere related concerning the Cryſtallizations of Salt-Peter and Sea-Salt, diſſolv'd together in ordinary water; where moſt commonly grains of Salt of reſulting figures are produc'd; and alſo a conſiderable part of the Sea-ſalt coagulates in the form of imperfect Cubes about the bottom, before the nitrous Corpuſcles ſhoot into Cryſtals of their own (almoſt priſmatical) ſhape. And I might further add, that it matters not, whether the ſuperfluous water be waſted by Exhalation, or by being drained by a body fit to ſoak it up; as we have had occaſion to obſerve in accelerating the Cryſtallization of ſome Bodies, where I was not willing to imploy the heat of the fire, by placing, underneath the Solution, dry'd Earth, or ſome other porous and ſoaking body.

With ſome Analogy to ſuch inſtances as theſe, we may conceive, that where there are Petreſcent Liquors, mingled with common water, there may, by divers accidents, and particularly an hot Summer, a ſufficient diſcharge be made of the ſuperfluous moiſture, to make the more diſpoſed parts of the Petreſcent Liquor to coagulate, and afterwards the coagulation may be ſuſpended, either by the ſupervening of a colder ſeaſon, as Winter; or even in Summer it ſelf, by a plentiful rain, or the effect of it, a Land-flood, which might check the progreſs of coalitions by overmuch diluteing the Liquor, that might elſe have turn'd into Stone. Not to mention, that trial hath aſſured me, that there are Bodies, and thoſe of very differing kinds, which will in tract of time, eſpecially if their coalition be further'd by cold weather, coagulate, after they have long remained in a fluidform, though the water or other *menſtruum*, by being inclos'd in ſtopt Glaſſes, be kept from waſting. And ſince the Earth harbors differing kinds of theſe Liquors (as I have elſewhere ſhewn) and divers of them may be copiouſly impregnated, ſome of them with one ſort of Mineral, and ſome with another; we may conceive, that they may have diſtinct periods for their reſpective coalitions, and yet may ſtick cloſe to one another; in regard that, though in our Chymical Cryſtallizations the Artiſts are wont to take out of the veſſel what ſhoots the firſt time, before they make a freſh exhalation of the water for a new Cryſtallization, and by this means have the coagulated Bodies, that they obtain at one time, more uniformly ſhap'd; yet in the hollow Receptacles, that the

Earth affords to Petreſcent Liquors, the Veſſels continuing the ſame from firſt to laſt, the Uniformity of the Bodies produc'd by coalitions made at ſeveral times muſt be leſs regular, and the *manifeſt* accretions or aggregates of coaleſcent Bodies muſt in all likelihood be more frequent. And accordingly having ſuffer'd the exhaling of ſome Liquors to be continued in the ſame Veſſel, I had coalitions of very differing Bodies at the bottom.

What I was not long ſince ſaying, makes me remember, that in order to a ſatisfaction (which the Event gave me) of the conjectures I had about the ſucceſſive concretions of ſome ſolid Fire-ſtones, that were not ſuſpected to be other than intire and uniform maſſes, I caus'd two or three that I thought likely and of very different ſizes and ſhapes, and brought from diſtant places, to be warily broken: Which Tryal gave me the pleaſure of obſerving, that the internal Texture of the leaſt of theſe Minerals, which was almoſt ſpherical, was very differing from that of the more internal part of the ſubſtance of the Stone. And that in the other and greateſt Mineral there was a little globulous Stone, that manifeſtly was not of the ſame piece with the invironing maſs, differing from it not only in Texture, but here and there by a diſcernable Commiſſure: though in moſt places their Adhæſion was ſo ſtrict, that we could not make any ſeparation of the two Minerals by the help of this Commiſſure. The greateſt part of this double Fire-ſtone I keep by me, and ſhall ſay nothing of what I further obſerv'd in it, having mention'd what I ſaid already but upon the by.

I might add, that in ſome Circumſtances, even in thoſe Veſſels, and therefore without any manifeſt exhalation of the water or other *Menſtruum*, and ſometimes where the diſſolv'd Body was homogeneous, I have in proceſs of time hád coagulations, where the laſt form'd Cryſtals ſeem'd plainly to have been generated by way of accretion to the firſt.

Difficulty. Having now done with

my *Obſervation*, I ſhall endeavour to clear a grand Difficulty, which I foreſee may be *objected* againſt our *Hypotheſis*, namely, That theſe *Aggenerations* (if I may ſo call them) of Medicinal and other Stones are ſometimes found in places, where there are no petrifying Springs, and perhaps no Springs or other Waters at all, nay little or nothing but Quarries or other maſſes of Stone.

But to this I anſwer, *Firſt*, that if we admit of the Relations, that I elſewhere mention out of approved Authors concerning Men and Beaſts turn'd into Stone by a petrifying Spirit, that ſuddenly invaded them, it will not be abſolutely neceſſary that there ſhould be any Petreſcent Springs or other like water to produce ſuch Minerals, as we are now diſcourſing of.

Secondly, for ought has yet been ſhewn to the contrary, we may ſuppoſe that Rain-water does ſometimes bring along with it ſuch petrifying particles as may ſerve our turn. In confirmation whereof I ſhall add, that having of a learned and judicious perſon inquired after divers particulars relating to a famous Bath; by him viſited in *Hungary*, whoſe Water abounds very much with Petreſcent particles, over which there is very high Building erected, I learn'd by his anſwers, among other remarkable things, that to the Roof or upper part of this tall Structure there were faſtened many long ſtony concretions, (like thoſe wont to be imploy'd to adorn *Groto's*;) which he affirmed to be from time to time generated there, not, as I at firſt ſuſpected, by the daſhing up of any drops of water; (which he averr'd could not reach any thing near ſo high,) but by the copious petrific ſteams, that being there checked in their aſcent, did, according to their natural propenſity, coagulate into Stone. Whether this Relation may warrant me to gueſs, that in ſome places Stones may be generated, without the help either of Rain or Springs, by the aſcent of Petrific particles in the form of exhalations from ſome lower parts of the Earth; which exhalations, ſuffering the lighter ſteams that accompanied them to exhale, may operate upon ſome diſpoſed materials that they find in their way, and turn them into Stone: whether, I ſay, this narrative may well ſuggeſt this conjecture; I ſhall not now ſtay to examine, though the Earthy and ſometimes Sulphureous ſediments that have been obſerv'd at the bottom of Rain-waters, ſuffer'd to ſettle in clean veſſels, may ſeem to favour it; and though alſo I might illuſtrate it by what I obſerv'd in a Bottle of diſtill'd Liquor, whereof no part would naturally aſcend in a dry form: for having kept this Viol well ſtop'd in a ſafe and quiet place for a year or two, I obſerv'd that the aſcending ſteams had quite pervaded the Cork, and had formed at the top of it numerous whitiſh *ſtiriæ*, ſlender, but of a length that ſurprized me.

Thirdly, there is no neceſſitie, that in all ſoils, where petrific waters are to be met with, there ſhould be petrifying Springs, at leaſt above ground. For I have cauſed to be digg'd ſtore of figur'd and tranſparent Stones in a certain Earth, that lay upon the upper part of a Rock, and ſeem'd to be a very dry Soil: Perhaps you will allow me to tell you, that I have by pouring a ſolution of ſtony *ſtiriæ*, made with Spirit of *Verdigreaſe*, on a convenient quantitie of *Bolus Armenus*, and ſuffering the ſoft mixture to remain in a Glaſs in the open Air, till the ſuperfluous moiſture was exhal'd; I have, I ſay, by this means imitated in a little, what I have been now relating, and found ſmall but unting'd and figur'd Cryſtals diſperſed through the little Cavities of the Red Earth. But 'twill be more conſiderable to our preſent purpſe to add, that the faireſt and hardeſt petrifying Wood, that I ever had or tryed, was taken up by an Ingenious perſon I imployed in a Plot of Sandy ground, where he could not find any petrifying or ſo much as any other Spring. To which I know not whether I ſhould add, that ſuppoſing the ground to have been once moiſtened with a Lapideſcent Liquor, whether brought thither by Springs, or any other way; one may in our *Hypotheſis* well enough account for this difficult *Phæno-*

menon, that now and then, not only in the ſurface of the ground, and perhaps upon Rocks themſelves there are found Aggregates of figur'd Stones, that ſeem to grow upwards, as it were from a Root; which much puzzle men to know how they came there, and may incline them to their opinion, who aſcribe Vegetations to Stones. But to this may be anſwered, that many of the Concretions, we are ſpeaking of, may have been formed in wombs that lay, though not deep, yet under ground, or in ſhallow cavities in the ſurface of it, and that, after their formation, the looſer Earth that ſurrounded them, may have been waſhed off by Rains, blown off by Winds, or otherwiſe remov'd, leaving behind them theſe Stones that adher'd firmly to a ſolid Body. Beſides, if I had time, I think it were very poſſible for me to ſhew, that ſtony Concretions might be produc'd by the Mechanical action of the Air upon the ſtony particles that ſucceſſively apply themſelves to the matter, that firſt begins to coagulate, when they are ready

to

to be forſaken by the moiſture that accompanied thoſe particles, and was neceſſary to their due application to the caſual rudiments (which paſs for Roots) in imitation whereof I have more than once obtained both from ſaline and ſtony Solutions, dry tufts of prettily figur'd, and diaphanous or white, but very ſlender, *ſtiriæ*, (if I may ſo call them) that ſeemed to grow out of the ſolid Glaſs, and made men wonder how they came thither, no Water or other Liquor appearing near them.

Fourthly, It may very well happen, that the Petreſcent Liquor may be ſo mingled and dilated with ordinary water, as not to be diſtinguiſhed from it by the generality of men, nor to be capable of diſcloſing it-ſelf by its effects, till either by the copious exhalation of the common water, or by ſome peculiar advantages, it has to operate upon Bodies, it has opportunity to diſcover it ſelf. On which occaſion I ſhall add, that there is a Lake in the North of *Ireland*, wherein I could never hear but that Fiſhes lived as well as in other

Lakes, and yet there are ſome Rocks near the bottom of it, to which there faſten themſelves divers maſſes and other pieces of a finely figured ſubſtance, and tranſparent as Cryſtal; of which an eminent perſon, the chief Owner of the Lake, preſented me with ſome, and promiſed me more. Now if we ſuppoſe, that either by Springs of Petreſcent water, or by Rains, or by ſubterraneal ſteams, or otherwiſe, waters, reſting in any hollow place, though upon the top of Rocks and Mountains, ſhall be ſufficiently impregnated with Petrific particles; and that afterwards in proceſs of time the meerly aqueous parts ſhall be, by degrees, by the heat of the Sun, the ſoaking of the grounds, the winds, or the continual action of the Air, brought to exhale away in the form of Vapors, the Petrific particles, which are not ſo volatile, will turn the Soil beneath them and on the ſides of them, as far as the Sphere of their activity reaches, into Stone harder or ſofter, of this or that kind, according to the particular nature of the Petreſcent Liquors, and the Structure and other dipoſitions of the Soil they invade: In which Soil, if there chance to be lodged Bodies heterogeneous to it, whether vegetable ſubſtances, as Roots, pieces of Wood, Gums, &c. or the whole Bodies of Animals, as Toads, Frogs, Serpents, Fiſhes, &c. or their parts, as Shells, Bones, &c. or Minerals of an open Texture, as Boles, unripe Ores; or elſe Gems or Stones of another kind already form'd; any of theſe things or any other that ſhall chance to be lodged there, muſt be found either petrified or incloſed in Stone, when this changed and hardened Soil ſhall come to be broken up. Nor is it at all neceſſary, that this petrefaction of the extraneous Bodies, and of the Soil or Bed, be made at once: For, it may well be made ſucceſſively at ſeveral times, according as ſome parts of the Petreſcent Juice happen to be more copious and penetrant, and conſequently more fit to be ſoaked in further than other. For, as the porouſneſs happens to be greater in one part of the Soil than in another; or as the Texture and diſpoſition of particular Bodies, lodged in the Earth, gives advantage to the Petrific particles to work on ſome of them ſooner, or in a differing manner than in others; ſo the Induration of the pervaded matters may be very unequally made in point of time, as well as in other circumſtances. So that (to omit many other things explicable by it) we may, from what hath been already deliver'd, conceive, how it may happen, that Medical Stones of very differing Colours, Conſiſtencies, and Operations (of which I have ſeveral by me, that I had from the ſame Mineral maſs,) may be generated and ſeem intire Bodies, though (as in ſome that I found,) the difference is ſo great, that one part of the Medical Stone is dark, heavy, and opacous, and the other much lighter, tranſparent, and quite otherwiſe colour'd. And upon the ſame Principle may be explained, what I lately mentioned to you about the finding of Diamonds incloſed in looſe Stones and even in Rocks; of which we have credible

Teſtimony: which ſeems not more ſtrange to me than a Stone, which I have by me, which being a kind of Pible, contains in it a perfectly ſhap'd Serpent, coild up, but without a head, which appears to have been formed before the Stone, in regard that in the upper and lower parts of the ſolid Stone there are cavities left, which together make up one Cavitie, juſt of the ſize and ſhape of the contained body; to which as it was eaſie for the matter of the Stone, whilſt 'twas yet a ſoft body, to accommodate it ſelf exactly; ſo 'tis ſcarſe conceivable, how, if the Pible had been firſt form'd, the incloſed *animal*, if it were one, or the matter whereof the ſeeming animal afterwards was formed, ſhould not only get in, but find a cavity ſo curiouſly ſhap'd and ſo fitted to its bulk. And that this variety was produced at ſeveral times, might be further argued from this, that the ſeeming Serpent is plainly of another and clearer kind of Stone than that of the Mold, that incompaſſes it; and of the Mold it ſelf, one part, contiguous to the included body, is whitiſh, and abounds in ſhining grains or flakes; in both which, it differs from the other and far greater part. And now it will be time to haſten to the

Fifth conſideration, which is, that for ought we know, in thoſe very places, where now there is nothing to be ſeen but looſe Stones, and perhaps beds of Stone themſelves, that in thoſe very places (I ſay) there may in times paſt have been Petreſcent Liquors, whether ſtagnant or running. For, I * elſewhere ſhew, (to an other purpoſe) that Earthquakes, Inundations of Seas and Rivers, ſinkings of ground, incroachments of the Land on the Water, fiery Eruptions and other ſuch Accidents, (ſome related by Authentick Authors, and others happening in our own times, in places, ſome of which I had the curioſitie to ſee,) have among other odd effects been able to dry or choak up Pools and Lakes, and to ſtop and quite divert the courſe not only of Springs, but

* In an *Examen* of an Experiment urged for the Magnetiſm of the Earth.

but of Rivers, ſo as to leave no footſteps of them, where they plentifully flow'd before. Upon the ſcore of which tranſpoſitions of notable quantities of terreſtrial matter and other great changes of the ſtructure and diſpoſition of the Soil in divers places, it may well be ſuſpected, that the ſtony Wombs or Molds, wherein the above mentioned Bodies were found, were heretofore at ſometime or other, of a muddy or earthy Nature, and were receptacles of Petreſcent Liquors, which at ſeveral times turn'd the whole maſs of the Soil into Stone, before the Springs or other Waters, containing the Petrific Liquors or Spirits, were quite conſumed, or had their courſe altogether diverted. But though I could ſay much more to confirm and apply this, and the preceding conſiderations; yet having ſpent ſo much of my time already, I ſhall not only leave all that unſaid, but, to make ſome amends for having ſtaid ſo long in clearing this difficulty, I ſhall do little more than name the two remaining Arguments.

Arg. III. It agrees very well with what we were formerly ſaying (in the firſt Argument) about the great ſpecific gravity of ſuch as the newly mention'd Stones, in compariſon of that of white Marble or tranſparent Pibles, that it ſhould be poſſible, out of thoſe Minerals to extract ſome of that ſubſtance, whether Metalline or of kin to it, upon whoſe account I told you I ſuppoſed them to be ſo ponderous. And accordingly we have by appropriated *Menſtruums* obtained, from the forementioned Bodies, (and not from thoſe only,) Solutions or Tinctures, which, beſides that, by their colour or taſte, they diſcover themſelves, did, upon their being dropt upon a Solution of Galls or ſome other convenient Liquor, or upon their being examin'd by other proper ways, produce ſuch changes of colour or ſuch determinate *Phænomena*, as argued them to abound with Metalline or Mineral particles, (which, for the moſt part of them I obſerv'd to be of a Vitriolate nature;) ſo I found, that the Solution of a *Blood-ſtone*, which taſted very rough upon the Tongue, would with the infuſion of Galls make an Inky mixture; and the like would alſo be made with Load-ſtone, Emery, Marchaſites, &c. open'd with corroſive *Menſtruums:* But the Solution of *Lapis Calaminaris*, which was of a golden colour, did not operate like the reſt on the infuſion of Galls; but yet by its taſt, as well as colour, ſufficiently diſcovered it ſelf to have copiouſly impregnated the *Menſtruum.* And now the mention of *Lapis Calaminaris* minds me to take thence an inſtance of what I lately intimated, that there may be other ways, beſides that of diſſolutions in proper *Menſtruums*, to ſhew, that ſome Medicinal Stones participate of Metalline and Mineral ſubſtances. For it is by melting *Lapis Calaminaris* with Copper, and keeping them together for a competent while in fuſion, that Braſs is made; wherein the red colour of the Copper is changed into a golden one, and the abſolute weight (for I ſpeak not of the ſpecific gravity) conſiderably increaſed. Nor is this the only Mineral Stone, from which I have, by a way quite differing from thoſe I have yet mentioned, namely with running Mercury; obtained a Metalline ſubſtance. And though native *Cinaber*, uſed by eminent Phyſitians both inwardly and outwardly, be looked upon by the Vulgar as only a red Stone; yet 'tis known, in the Quick-Silver Mines of *Friuli*, and ſome other places where it abounds, that it is a Mercurial Ore, whence by vehement fires they diſtill running Mercury, which we by moderate ones have ſometimes done.

But here perhaps it may not be improper to tell you, that though, before any admonition given men of the expediency of examining ſtones Hydroſtatically, I could not receive from others, yet I made againſt my ſelf the following Objection, That there are ſome Stones, to which uſeful Qualities are aſcribed, which are either not at all heavier *in ſpecie* than is requiſite for a Stone, as ſuch, to be; or ſo little heavier, that 'tis no way likely, that Metals or any ſuch ponderous Minerals ſhould contribute either to their Productions or their Virtues.

In anſwer whereunto I thought it may be ſaid in the firſt place, that our *Hypotheſis* does no way oblige us to deny, that there may be ſuch Stones. For though it aſcribes the Virtues of moſt Gems and Metalline Stones to the metalline and ponderous Mineral ſubſtances they partake of, yet the conceſſion agrees very well with our Doctrine; which, (as will in the Fourth Argument be more manifeſted) ſpeaks in general, when it teaches, that the Virtues of Stones may, in many caſes, depend upon their conſiſting not of a pure petreſcent ſubſtance, but a ſubſtance impregnated with other Minerals, which, though moſt commonly they prove ſpecifically heavier than the Petreſcent matter, as ſuch, without being the leſs, but rather in ſome caſes the more operative and communicative of their Virtues; yet in divers ſtony concretions, the adventitious ingredients may be ſpecifically lighter than the genuine matter of the Stone,

Stone; as may be eaſily gathered from ſome paſſages of the foregoing Diſcourſe. For, not here to urge, that divers Bodies, that paſs for Stones, do abound in particles of Salt, which may be much leſs heavy than pure Stone of the like bulk, I have obſerv'd, that ſome other hard Foſſils abound with a kind of *Bitumen*, which, when by diſtillation brought to an Oyl, is much leſs heavie than a Stone of the ſame bulk. And, as I remember, I have had ſome portions of ſuch Oil, that would ſwim even upon common water: and leſt this ſhould be aſcribed to the ſubtilization, the *Bitumen* received from the fire; I will add, that, having Hydroſtatically weighed a piece of good *Aſphaltum*, we found it to be to water of the ſame bulk, but as 1 and ſomewhat leſs than $\frac{4}{10}$ to 1. Which was within a Tenth of the proportion to water of a ſtony, though a bituminous, Foſſile, commonly call'd in *England* Scotch-Coal. And becauſe Sulphur as well as *Bitumen*, is very apt, (and indeed more apt than before tryal I expected) by even a moderate heat or attrition to diffuſe its ſteams, (uſually ranck ſented enough;) I ſhall add, that there are Variety of hard Stones, which abound in *Sulphur:* (witneſs that in ſome places they obtain their common *Brimſtone* by ſublimation thence) and yet having weigh'd a Role of Brimſtone in Fire and Water, I found it to be but a fraction ſcarce worth mentioning above double its weight to the Liquor; which ſhews it to be much lighter *in ſpecie* than Cryſtal it ſelf.

An improvement of this firſt Anſwer may furniſh me with the ſecond. For hence we may argue, that 'tis not impoſſible, that the principal virtue of a light Medical Stone ſhould be due to ſome mixture of a Metalline or the like ponderous ſubſtance; ſince, if ſome of the ingredients, that are plentifully mix'd with the true ſtony matter, be of the lighter ſort, though there be alſo ſome Metalline or other heavie Mineral particles mingled with the ſame matter, yet the ſpecific Levity of the one, in compariſon of this matter, may compenſate

penſate the ſpecific Gravity of the other, and they may all compoſe a Stone, either leſs, or not more, ponderous than white Marble. On which occaſion, I remember, not only that I found a blackiſh *Eaſt-Indian* Flint, and likewiſe a Black *Engliſh* one, to have to water not full the proportion of $2\frac{6}{10}$ to one, but that one of the firſt pieces of black Marble that I examin'd Hydroſtatically, was found, notwithſtanding the darkneſs of its colour, to be to water of the ſame bulk ſcarce any thing more than $2\frac{7}{10}$ to 1. which you may remember was the proportion I found between white Marble & water, unleſs we ſhould ſay, that this blackneſs of colour proceeded, not ſo much from any groſs Bituminous matter, imbodied with that of the Stone, but from ſome Mineral ſmoak that had pervaded it. And this puts me in mind of ſpeaking ſomething in this place about what might properly enough have been diſcourſed of long ago.

Wherefore I ſhall ſubjoin in the Third place, that it ſeems not impoſſible, that the matter which Medical Stones are made of, may, before it comes to be hardened, derive various colours and be imbued with Virtues by ſubterrraneal Exhalations and other ſteams. This I fear you will think ſomewhat ſtrange, and therefore I ſhall briefly endeavour to confirm it by the mention of two or three particulars.

That then many places of the lower part of the Earth emit copious exhalations into the upper, and even into the Air it ſelf; I preſume you will grant, and I have elſewhere proved it. That alſo ſuch ſubterraneal ſteams will eaſily mingle with Liquors, and imbue them with their own Qualities, may be inferr'd from the Experiment of mixing the *Gas*, (as the *Helmontians* call it) or the ſcarce coagulable fumes of kindled and extinquiſhed Brimſtone, with Wine, which is thereby long preſerved. And I have elſewhere mentioned, how I have incorporated this Smoak with other Liquors, wherein I obſerved its operations to be notable.

That beneath the ſurface of the

Earth there may be ſulphureous and other ſteams, that may be plentifully mix'd with water, and there in likelihood with Lapideſcent Liquors, I have alſo manifeſted in another * Dicourſe.

* *Of* Subterraneal *Steams.*

That Quick-ſilver may be in part reſolved into Fumes by leſs fires than many of thoſe that burn under ground, will be readily acknowledged by Chymiſts and Gilders, and is obvious in the Fumigations imployed in the Cure of the *Lues Venerea.* And that Mercury may in the bowels of the Earth be ſo diſguiſed, and well mixed with ſtony matter, as to ſuffer the whole concretion to paſs for Stone, may be obſerved in ſome kind of native Cinaber.

That Sal Armoniac, of which in ſome places there is to be dug up ſtore, will, with a moderate fire, be made to aſcend in form of exhalations, is vulgarly known, as to the factitious Salt of that name, and I have found it to hold in the native. That common Sal Armoniac, Sulphur, Mercury and Tin will be ſublimed into a Gold-like ſubſtance, that participates of moſt, if not of all the Ingredients, may appear by the account I have elſewhere given of the way, I us'd in making *Aurum Muſicum*: And that even Gold it ſelf, the heavieſt and fixeſt of the bodies we know, may by no great proportion of Additament, and that with but a moderate fire, be made to aſcend in the form of Fumes or even of Flame, I have ſeveral times tryed, by wayes elſewhere deliver'd. And that Mineral Exhalations may be met with in the bowels of the Earth, is witneſſed by the Relations of divers Credible perſons, converſant about *Minerals*, that affirm themſelves to teſtifie what they write upon their own Obſervation to which; ſome things that I had ſeen my ſelf did the more incline me to give credit. And this copious aſcenſion of Mineral fumes and even of Metalline ones, may be much confirmed not only by what is written by profeſſed Chymiſts, but by the Learned and curious *Johannes Kentmannus*, who, in the uſeful Catalogue of the *Miſnian* Foſſils he had collected, amongſt the *Pyritæ* or fire-ſtones, reckons one, whoſe title is *Pumicoſus, & ab exhalatione ardenti nigro colore tinctus*; and another, whoſe inſcription is *Coloris argenti, qui ab exhalatione viroſa colore cinereo eſt tinctus.* The ſame may be further confirmed by what I have ſome where met with as related *in terminis* by the Learned *Cabæus*, that he found in the Territory of *Modena.*

To bring this home to our purpoſe, ſince there are Mineral Exhalations of very differing kinds, diſperſed in divers places under ground, and ſince there are ſeveral volatile Minerals, as Arſenic, Orpiment, Sandarach, &c. that are very actively hurtful; there may be others indowed with Medicinal Qualities, and the Exhalations of ſuch Minerals either alone or mix'd with Petreſcent Liquors, pervading duly diſpoſed Earths and Boluſſes, and other fluid, ſoft, or open ſubſtances, before their induration, may endow them with Medicinal and other Qualities.

Nay, when I recall to mind the old *Phænomena* that I have partly obſerved, and partly received from credible teſtimony, about the coalitions,mixtures, tinctures, and the emanations, as 'twere, of thoſe Tinctures, in metalline, ſtony, and other foſſile concretions; I dare not peremptorily deny, but that, even after ſubterraneal bodies have obtained a conſiderable degree of induration, and perhaps great enough to make them paſs for ſtony ones, there may be ſubterraneal ſteams ſubtle enough to penetrate, tinge, and otherwiſe impregnate them. Which you would think the leſs impoſſible, if you reflect upon what I juſt now related out of *Kentman*; and eſpecially if I had time to add here, what I remember, I elſewhere deliver about my tryals to tinge native Cryſtal with differing colours by the fumes of volatile Minerals. And that a very ſmall proportion of a Metalline ſubſtance, reſolved into minute particles, may ſuffice to impart a tincture to a greater quantity of other matter duly diſpoſed, may appear by thoſe factitious Gems, wherein with three or four grains of a skilfully calcin'd Metal, or ſome ſuch Mineral pigment, we may give the colour of a natural Gem to a whole Ounce or more of vitrified matter. And I remember, that in ſubtiler fluids, I have made the inſtance by vaſt odds more conſpicuous, having ting'd with one grain or leſs of a prepared Metal (as Gold or Copper) as much ſucceſſively generated phlegm, as, if it could have been all preſerved, would have amounted to a bulky lump of deeply coloured matter.

But your allowing the heſitancy I have expreſſed in this laſt Paragraph, is not neceſſary to my preſent purpoſe; wherefore I ſhall not borrow any thing to countenance it from another Paper, but paſs on to what remains.

Arg. IV. The *laſt* thing, that I ſhall repreſent to ſhew, that the Virtues of opacous Gems and Medicinal ſtones may be more eaſily, than thoſe of tranſparent ones, accounted for in our *Hypotheſis*, is this, That the main Ingredients, whereof many ſuch opacous Stones conſiſt, were complete Mineral bodies before they became Stones; *ſome* of them having been Medicinal Boluſſes, or the like Earths; *ſome*, Earths abounding with Metalline or Mineral Juices; *ſome*, Ores of Metals, or Minerals of kin to, Metals; and *ſome*, *in fine*, Bodies of other ſorts or natures differing from theſe and one another. For, all theſe ſeveral kinds of foſſils may, by the ſupervening and pervaſion of Petrific Spirits, be turn'd into Stone, and conſequently retain many of the Virtues, they were indowed with by the Mineral Corpuſcles, that had copiouſly, either under the form of Liquors, or Exhalations, impregnated them, whilſt they were yet Earths, or other bodies of a more open or Penetrable Texture.

I might illuſtrate this by the way I elſewhere mention, whereby I made ſuch mixtures even of Stony and Metalline Ingredients, that notwithſtanding their coalition were tranſparent, though you will grant that to be more difficult, than to compound ſuch concretions when one is allowed to make them opacous.

But here I muſt obviate an objection, which I foreſee may be made againſt our preſent Fourth Argument, unto which even what I have been now ſaying may afford a riſe. For ſince it ſeems by our Doctrine, that Gems may be but *Magiſteries*, and conſequently but ſuch compoſitions, as though made in the bowels of the Earth, might be made or imitated by humane skill, it may ſeem very improbable to many, that bodies ſo near of kin to Artificial ones, ſhould be endowed with ſuch peculiar and ſome of them with ſuch ſtrange Virtues as are aſcribed to divers Gems, and are thought to be capable of flowing only from certain Subſtantial forms and thoſe very noble ones too.

To this I might reply, that I admit not any ſuch imaginary Beings as the Peripatetic Forms, which I fear they will never be able to demonſtrate. But to avoid unneceſſary diſputes, I will rather anſwer in ſhort, that ſuch compoſitions as are call'd Artificial, may, for all that, be indowed with great Virtues, and ſuch as are call'd Specific; witneſs the Virtues of many Chymical Preparations, even of thoſe that are uſed by Phyſitians of all ſorts. And leſt you ſhould think, I need to fly to

Chymiſtry, of which ſome Learned Men are pleaſed to have a great diſtaſt, I will name a couple of inſtances out of *Galen* himſelf; The one is the Aſhes of Crafiſh, to which, notwithſtanding the deſtruction that has been made of the priſtine Body by fire, he gives a greater commendation againſt the, as ſtrange, as fatal poyſon infus'd by the biting of a mad Dog, than he does either to the Fiſh it ſelf unburn'd, or to any medicine of Natures own providing; and I hope you will grant a Virtue of that kind and degree to be ſpecific enough. My other Inſtance ſhall be taken from Treacle, which though allowedly a factitious body, and conſiſting of I know not how many Ingredients ſhuffled together, was yet in the dayes of *Galen* (to whom a Book is attributed about it) and ever ſince has been the famouſeſt Antidote in theſe parts of the world, and has been celebrated not only for its Alexipharmacal Virtues, which alone are ſufficient to intitle it to ſpecific ones, but for divers others which are generally aſcribed to it, ſome indeed upon the ſcore of Manifeſt, but others alſo upon that of Occult Qualities:

The objection being thus diſpatch'd, we may return to our Medicinal Stones, about which I ſhall venture to add, that according to our way of Explicating the production of them, a not impoſſible Solution may be offer'd of this difficult *Phænomenon*. That ſometimes Stones, that are thought without ſcruple to be of the ſame kind (as hath been particularly obſerved by Learned men of the *Lapis Nephriticus*) are of ſuch different qualifications, that ſome of them prove very conſiderable Remedies in caſes where others prove almoſt utterly ineffectual. And I have obſerv'd alſo, though very rarely, that a Medical Stone may have Virtues, that are taught to be the properties of Stones of another kind. For, according to our *Hypotheſis*, when the ſtony matter is impregnated as it ought to be with thoſe Minerals, that in the ordinary courſe of nature belong to that *ſpecies*, its

See *Unzerus de Nephrit.*

its Virtue will be ſuch as it ſhould be for kind, but for degree may be very various, anſwerable to the plenty, purity, ſubtlety, &c. of the Mineral that impregnates it. But if the ſtony matter chance to be inbued with ſome other ſubſtance of a contrary nature, though perhaps the proportion of it may be ſo ſmall, and the colour of it ſuch, as not to make an alteration in the Stone obvious to ſenſe, and great enough to make it judged to be of an other *ſpecies*; yet it may ſo vitiate the matter wherein its expected Quality reſides, or check and infringe its operations, as not to leave the Stone any conſiderable degree of Virtue. And on the other ſide, if it happen that the Mineral Corpuſcles, that are wont to impart a certain Virtue to the ſtony matter of one Gem, ſhould, by ſome lucky hit, be ſo united with that of an other ſort of Gems (of which caſe I formerly gave an Inſtance in green Diamonds,) though the quantity of this unuſual Ingredient may be but very ſmall, yet, if it's efficacy be great, it may innoble the Stone with a notable degree of ſome ſuch Virtue, as is ſuppoſed not to belong to that *Species*, but to an other.

And on this occaſion I ſhall add, that I know a Gentleman (a profeſſed Scholar) who to the Eye ſeems to be of a Complexion extraordinarily Sanguin: This perſon was for a long time ſo troubled with exceſſive bleedings at the Noſe, that, notwithſtanding all the Remedies he could procure in an Academy of Phyſick, where he lived, he was divers times brought to Death's door, till at length his Caſe growing very famous, there was ſent him by an antient Gentlewoman a Blood-ſtone, about the bigneſs of a Pigeons Egg, with an aſſurance that it had done ſcarce credible Cures in his Diſeaſe, by being worn about the Patients Neck. Upon the uſe of this Stone he quickly recovered his Health, and had long injoyed it when I convers'd with him, but yet ſo, that when he left it off any conſiderable time, his diſtemper would return. And when I ſeem'd to ſuſpect that imagination might have an intereſt in the efficacy of this Remedy, he anſwer'd, that he was very well ſatified of the negative; and particularly upon this tryal, that he had, by the hands of a third perſon that liv'd not far off, and whom he nam'd to me, ſtop'd a Hæmorrogie in a neighbouring Gentlewoman, whom the violence of the Diſtemper kept from knowing that any thing had been applyed to her, till a pretty while after the Blood was ſtanched. I ſhall not here mention other Inſtances, though very remarkable, of the efficacy of this Stone, which I had both from the Gentleman himſelf, and an intimate Friend of his, who is a very Learned Man and a Phyſitian; becauſe I have ſaid enough to make it ſeaſonable for me to tell you, that notwithſtanding all the odd operations of this Stone, when I came to look upon it, 'twas ſo differing in Colour and Texture from what I expected, that I ſhould have taken it much rather for a Gem of ſome other *ſpecies* than a Blood-ſtone.

To confirm ſome of the Particulars

comprized in this our Fourth Argument, and ſhew the variety and ſometimes great plenty of Mineral and other ſubterraneal matters, that may concur to the compoſition of Bodies that paſs for Stones; I ſhall obſerve, that the ſubtilty and penetrancy of ſome Liquors, if duly conſider'd, may evince it to be poſſible, that ſuch Bodies ſhould be petrified by them and with them, as may in part conſiſt of Animal and Vegetable ſubſtances, as in petrified Skulls, Bones, and pieces of wood: And we ſee, that ſoft Stone, which is plentifully found near *Naples*, and commonly call'd the *Lapis Lyncurius*, being rubb'd a little and moſtened with water, and then expos'd to the Sun in a due ſeaſon of the year, will, in a very ſhort time, (as Eye-witneſſes have aſſured me,) produce Muſhroms fit to be eaten; as if even the ſeminal Principles and Rudiments of Vegetables may be ſo preſerved in a petrified Earth, as to be able to diſcloſe themſelves when they find an opportunity. To which agrees well, what an eminent perſon, Maſter of ſome of theſe Stones, informs me, *That they now and then find them of a vaſt bigneſs*, as if whole maſſes of Earth, pregnant with the prolific Principles of Muſhroms, were, by ſome ſupervening but not very potently hardening Petreſcent Liquor, turn'd into Stone.

And not only there may be *Bolſuſes*, ſeal'd Earths, and ſuch like foſſils, that are commonly known to be Medicinal, harden'd into Stone by petrifying Agents; but alſo other Earths, ſubject to be petrified, may have Medicinal and ſubtle particles of ſuch a kind in them, as ſcarce any body would expect. But to omit Inſtances, belonging to another Paper, I have viſited a certain Clay-pit in a waſt piece of ground, in which at a condſierable depth from the ſurface of the Earth there lay a bed of Clay, which by diſtillation yielded ſome acquaintances of mine a Salt ſo volatile and ſtrong, and ſo differing from other ſubterraneal Salts, that my Examens did not diſcover the manifeſt qualities of it without ſome wonder; and the owners of it (perſons curious and rich) did themſelves uſe it as well as give it in Phyſic, and cryed it up for an excellent Cordial, and a great opening and Diaphoretic Medicine.

That ſublimable Salts, Sulphurs, Bitumens, (Bodies that communicate enough of their Virtues,) may be met with in the bowels of the Earth; I have elſewhere ſhewn: And that ſuch ſubſtances may be found in bodies that paſs for Stones, I have been induced to think by the Chymical Examen, that I purpoſely made of ſome ſuch concretions, particularly of that ſolid and heavie one, that is commonly call'd *Scotch-Coal*, from whence I obtained by diſtillation, (wherein I ſomewhat wonder'd, other mens Curioſity did not, as far as I knew, prevent me;) a good proportion of Oil or liquid *Bitumen*, and no ſmall number of Saline particles that ſeem'd to be of an uncommon nature.

That Metalline particles may concurr to make up a Body, that paſſes for a Medicinal Stone, may appear by native Sulphur which is it ſelf a compounded body, beſides a good proportion of Mineral Earth.

I had thoughts not to make an end of this Diſcourſe, without mentioning to you ſome attempts, that I partly deſign'd, and partly made, to illuſtrate ſome paſſages of it by purpoſely contriv'd Experiments, whereof ſome were unproſperouſly and others not altogether unſucceſsfully try'd. But not having the Minutes of them by me, and not daring to truſt my ſingle memory in Experiments ſo nice, and ſo long ſince made, as thoſe were, I ſhall here put an end to your trouble, eſpecially ſince at length I perceive, that the forgetfulneſs of my firſt intended brevity has miſled me ſo far beyond the bounds of it into Excurſions, whereinto the unforeſeen connexion of things unawar's engag'd me, that I ſtand in need both of your pardon and my own: Of *yours*, for having exercis'd your Patience with a prolix Diſcourſe; and of *my own*, for having receded from my Cuſtome, by contributing to that prolixity, and by expatiating upon Conjectures; to which, the more I conform to my own Practiſe, the leſs I am indulgent: Though theſe may be the more pardonable, becauſe I have propoſed them but as Gueſſes, not peremptory Aſſertions, much leſs Phyſical Demonſtrations. And if *Ariſtotle* himſelf, where he gives an account of *Phænomena* appearing above the ſurface of the Earth, ſcrupled not to think, he had done enough, if he had ſhewn, how ſuch things *may be* produc'd; I hope, it may be tolerable in me, who treat of things, that Nature does privately in her dark and ſubterraneal Receſſes, to have offer'd Accounts, that are poſſible, if not probable. And yet I ſhould have ſpent much leſs of my Diſcourſe upon Conjectures, if I had not ſeen, that they gave me Riſes to bring in more of Natural Hiſtory, than I could elſe decently do. But after all this I confeſs to you, (though you may think it a Paradox) that one of the main cauſes of the Prolixity of theſe Papers was my Haſt, and that Experience hath taught me, on this Occaſion (as well as on ſome others) that there may be more Truth than there is Likelihood in the gentile Conceipt of a *French Secretary*, that ſaid, He had written his Friend a long Letter, becauſe he had not Leiſure to write him a ſhort One.

FINIS.
